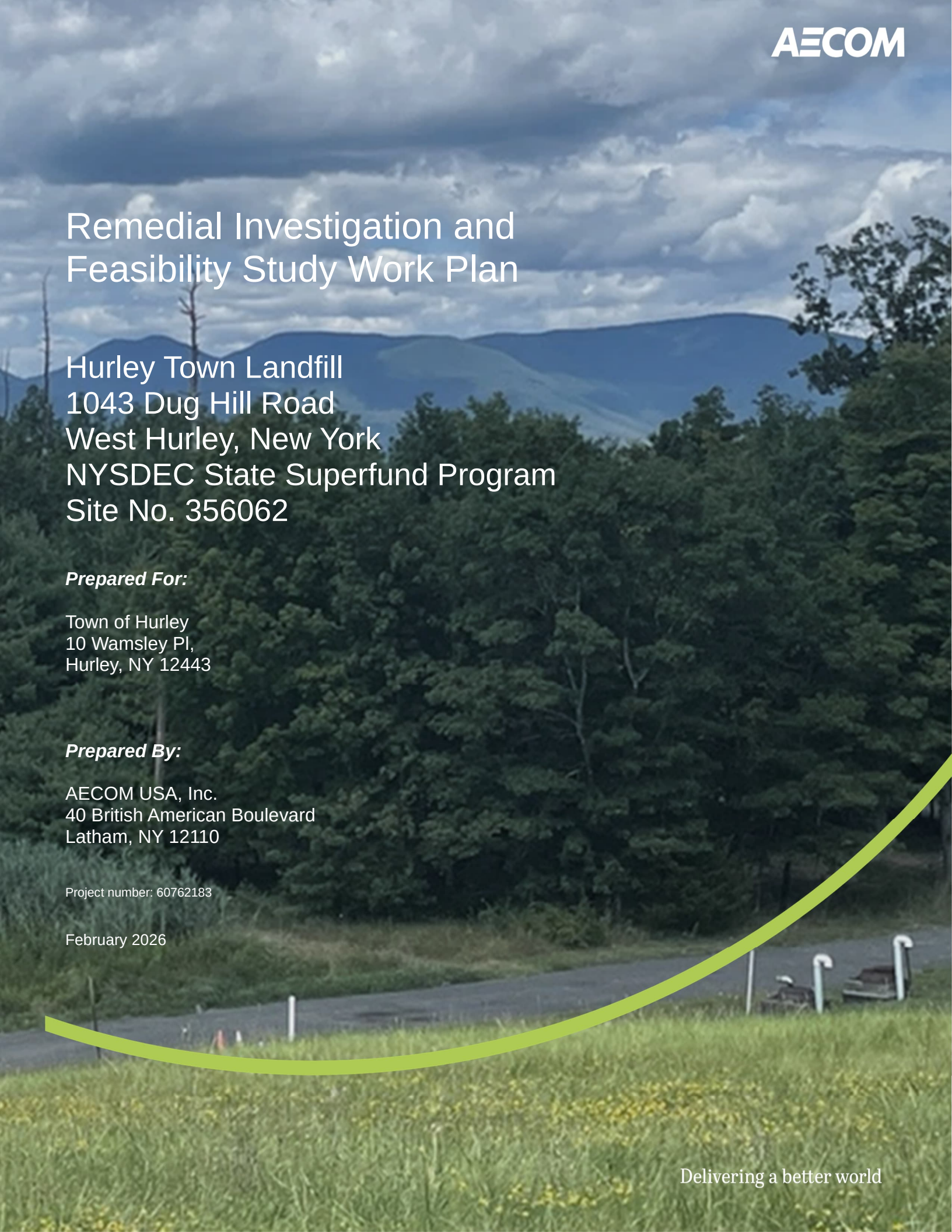


Remedial Investigation and Feasibility Study Work Plan

Hurley Town Landfill
1043 Dug Hill Road
West Hurley, New York
NYSDEC State Superfund Program
Site No. 356062

Prepared For:

Town of Hurley
10 Wamsley Pl,
Hurley, NY 12443

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Project number: 60762183

February 2026

Delivering a better world

Remedial Investigation and Feasibility Study Work Plan

Hurley Town Landfill
1043 Dug Hill Road
West Hurley, New York
NYSDEC State Superfund Program
Site No. 356062

Certification

I, Abdiel López Torres, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and DER Green Remediation (DER-31).

Respectfully submitted,

August 22, 2025
Revised: December 17, 2025
February 9, 2026

Abdiel López Torres, P.G. Date

February 2026

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Acronyms and Abbreviations

AECOM	AECOM USA, Inc.
AGL	above ground level
amsl	above mean sea level
AOI	area of interest
ASP	Analytical Services Protocol
ATV	acoustic televiewer
AWQGVs	Ambient Water Quality Standards and Guidance Values
bgs	below ground surface
BSGVs	bioaccumulation-based Sediment Guidance Values
C&A	Crawford & Associates
C&D	construction and demolition
CAD	computer assisted drafting
CAMP	Community Air Monitoring Plan
CCTV	closed-circuit television
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIR	Closure Investigation Report
Class AA (T)	(T) indicates that the waterbody is a trout source
CO	Consent Order
COC	chain-of-custody
CPP	Citizen Participation Plan
CSM	Conceptual Site Model
DER-10	NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation
DMM	Division of Materials Management
DPT	Direct Push Technology
DUSR	Data Usability Summary Report
EC	Emerging contaminant
EDD	electronic data deliverable
ELAP	Environmental Laboratory Approval Program
EPA	Environmental Protection Agency
FAA	Federal Aviation Agency
FS	Feasibility Study
ft. bgs	feet below ground surface
FWIA	Fish and Wildlife Impact Analysis
GIS	Geographic Information System
GPR	Ground Penetrating Radar
GSR	Green and Sustainable Remediation
HASP	Health and Safety Plan
HDPE	High-Density Polyethylene
HHEA	Human Health Exposure Assessment
HPFM	heat pulse flow meter
HSA	hollow stem auger
IDW	investigation-derived waste
IHWDS	inactive hazardous waste disposal site

IPaC	Information for Planning and Consultation
IRMs	interim remedial measures
Landfill	Hurley Town Landfill
LCS	leachate collection system
LMS	Lawler, Matusky & Skelly Engineers
LNAPL	light non-aqueous phase liquids
MCL	Maximum Contaminant Levels
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL/min	milliliters per minute
mph	miles per hour
MS/MSD	Matrix Spike/ Matrix Spike Duplicate
MSW	municipal solid waste
mV	millivolts
MW	monitoring well
NAD83	North American Datum 1983
NAVD88	North American Vertical Datum 1988
N-E+Fosaa	N-ethyl perfluorooctane sulfonamide
ng/L	nanograms per liter
NLEB	Northern-long eared bat
NOTAMs	notice to airmen
NTU	nephelometric units
NTU	turbidity
NWI	National Wetlands Inventory
NYC	New York City
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
^{o}C	Celsius
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OTV	optical tele-viewer
PCBs	Polychlorinated Biphenyls
PFAS	per- and polyfluoroalkyl substances
PFBA	Perfluorobutanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PFTrDA	Perfluorotridecanoic acid
PID	photoionization detector
PM-10	particulate matter less than 10 micrometers in size
POET	point of entry treatment
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PVC	Polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan

RGB	Red, Green, Blue imagery
RI	Remedial Investigation
RIFS WP	Remedial Investigation and Feasibility Study Work Plan
RQD	Rock Quality Designation
S.U.	standard units
SC	Site Characterization
SCGs	Soil Cleanup Guidance
SCOs	Soil Cleanup Objectives
SEFA	Spreadsheets for Environmental Footprint Analysis
SGVs	Sediment Guidance Values
SP	Spontaneous Potential
SPR	Single Point Resistance
SVI	soil vapor intrusion
SVOCs	Semi-volatile Organic Compounds
SW	surface water samples
TAL	Target Analyte List
TCL	Target Compound List
TCL/CP	Target Compound List/Cleanup Protocol
TFRs	temporary flight restrictions
TICs	tentatively identified compounds
TOC	total organic carbon
TOGS	Technical & Operational Guidance Series
UAS	Unmanned Aircraft System
UFWS	U.S. Fish & Wildlife Service
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA OSWER	Groundwater Sampling Guidelines for Superfund and RCRA Project Managers
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UTT	Ultrasonic thickness testing
VOCs	Volatile Organic Compounds
WWTP	Wastewater Treatment Plant
µg/kg	micrograms per kilograms
µg/L	micrograms per liter
µm	microns

1. Introduction

This Remedial Investigation and Feasibility Study Work Plan (RIFS WP) has been prepared by AECOM USA, Inc. (AECOM) on behalf of the Town of Hurley for its landfill located at 1043 Dug Hill Road, West Hurley, New York (Site) (Figure 1).

The Site is being managed under a Consent Order (CO) within the New York State Department of Environmental Conservation (NYSDEC) State Superfund Program (Site No. 356062, Index No. CO 3-20250310-57), dated July 1, 2025. AECOM developed this RIFS WP for the proposed investigations at the Site to meet the requirements of Title 6 NYCRR Parts 375-1.6 through 1.8 and 375-3.6 through 3.8. This RIFS WP has been prepared in accordance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) (NYSDEC, 2010).

This RIFS WP presents the project objectives, provides background information regarding historical Site use and current conditions, summarizes the results of previous investigations, and details the strategies and methodologies that will be implemented during the investigation. AECOM developed the following companion documents which support the procedures and protocols outlined in this RIFS WP:

- The Quality Assurance Project Plan (QAPP) (Appendix A) specifies the quality assurance/quality control procedures that will be implemented during the fieldwork and in the Environmental Laboratory Approval Program (ELAP) certified laboratory which performs the chemical analyses of the samples collected during the remedial investigation (RI).
- The site-specific Health and Safety Plan (HASP) (Appendix B) outlines procedures that will be strictly followed by field personnel to protect Site workers and visitors, and the public in the areas adjacent to the Site, from potential hazards that may exist as a result of the fieldwork performed at the Site.
- A Citizen Participation Plan (CPP) has been prepared as a separate document to provide information regarding community outreach activities for the Site. The CPP was submitted to the NYSDEC on June 21, 2025.

1.1 Project Objectives

Project objectives include:

- Evaluate the surface and subsurface characteristics of the Site to delineate the vertical and horizontal extent of site-related contamination in overburden and bedrock, assess contaminant fate and transport mechanisms in environmental media, and refine the Conceptual Site Model (CSM).
- Further assess the nature and extent of per- and polyfluoroalkyl substances (PFAS) and other potential site-related contaminants through the collection of soil, sediment, surface water, groundwater and landfill leachate samples.
- Assess the condition of the landfill features, including landfill cap holding tanks, leachate collection system and stormwater sewer to identify potential leachate seeps or leaks to the surrounding environment.
- Evaluate, qualitatively, actual and potential exposure pathways associated with site-related contaminants on and off-site to allow for fulfillment of DER-10 Appendix 3B Qualitative Human Health Exposure Assessment (HHEA) and DER-10 Appendix 3C Fish and Wildlife Impact Analysis (FWIA).
- Evaluate the concentration, toxicity, environmental fate transport in affected environmental media, and other significant characteristics of the site-related substance(s) present;

- Perform a Feasibility Study (FS) to evaluate remedial alternatives according to the applicable DER-10 program requirements. Propose remedial alternative(s) for discussion that is protective of human health and environment based on data, technical feasibility, Green and Sustainable Remediation (GSR) considerations per DER-31, and cost.
- Determine if interim remedial measures (IRMs) are necessary at the site, which may include potential approaches to reduce the amount leachate generated and viable alternatives for its disposal.

To accomplish these objectives, the field activities described in this RIFS WP will be implemented. Additional methodology information is provided in the QAPP and health and safety protocols are provided in the HASP.

1.2 Standards, Criteria and Guidance

To accomplish the above RI objectives and work scope, field and reporting activities will be conducted in general accordance with this RIFS WP, QAPP, HASP, and the following regulatory documents and standards:

- NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010);
- United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (USEPA, 1988);
- NYSDEC Division of Water Technical & Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1) (NYSDEC, 1998);
- NYSDEC Division of Fish, Wildlife and Marine Resources, Bureau of Habitat, Screening and Assessment of Contaminated Sediment (NYSDEC 2014);
- NYSDEC 6 NYCRR 703.5(f) Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (NYSDEC, 2004);
- NYSDEC, 6 NYCRR 375-6.8 Soil Cleanup Objectives (NYSDEC, 2006);
- NYSDEC CP-51 / Soil Cleanup Guidance (NYSDEC 2010), and;
- NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) (April 2023).

1.2.1 Groundwater

Groundwater analytical results will be compared to New York State Class GA Ambient Water Quality Standards and Guidance Values (AWQGVs) for Target Compound List (TCL) organic compounds and Target Analyte List (TAL) inorganic constituents, as specified in 6 NYCRR Part 703 and TOGS 1.1.1 (NYSDEC, 1998). For emerging contaminants, NYSDEC finalized AWQGVs in March 2023 for PFAS and 1,4-Dioxane to protect human health and drinking water sources:

- Perfluorooctanoic Acid (PFOA): 6.7 nanograms per liter (ng/L) or parts per trillion (ppt)
- Perfluorooctane Sulfonic Acid (PFOS): 2.7 ng/L (ppt)
- 1,4-Dioxane: 0.35 micrograms per liter (µg/L) or parts per billion (ppb)

1.2.2 Surface Water

Surface water samples will be compared to applicable surface water quality standards in 6 NYCRR Part 703 for evaluating potential human health and ecological receptor exposure pathways, including human consumption of fish and aquatic life protection. For emerging contaminants, the same AWQGVs apply:

- PFOA: 6.7 ng/L (ppt)
- PFOS: 2.7 ng/L (ppt)
- 1,4-Dioxane: 0.35 µg/L (ppb)

1.2.3 Soil

Soil analytical results for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics will be compared to the Protection of Groundwater Soil Cleanup Objectives (SCOs) in 6 NYCRR Part 375-6.

For PFAS, NYSDEC has not yet finalized SCOs for PFOA, PFOS, or other PFAS compounds; however, interim soil guidance values have been issued for use in remedial programs until SCOs are adopted. These interim values are based on the protection of groundwater and are currently:

- PFOA: 0.8 micrograms per kilograms (µg/kg)
- PFOS: 1.0 µg/kg

For 1,4-Dioxane, soil results will be compared to the Protection of Groundwater SCOs in 6 NYCRR Part 375-6, which currently is 0.1 milligrams per kilogram (mg/kg).

1.2.4 Sediment

Sediment data for TAL and TCL constituents collected during the RI will be compared to applicable Sediment Guidance Values (SGVs) as outlined in *Screening and Assessment of Contaminated Sediment* (NYSDEC, June 2014), including freshwater SGVs and bioaccumulation-based Sediment Guidance Values (BSGVs) for the protection of human health (fish consumption) and wildlife. Preliminary target levels for cleanup of PFOA and PFOS in sediment have not yet been established by NYSDEC.

1.3 Work Plan Organization

Following this introduction, the remainder of this RIFS WP provides additional Site information and describes the proposed RI activities, as follows:

- Section 2 – provides a description of the Site, summary information regarding Site ownership and operational history, and the results of the previous investigation work performed at the Site.
- Section 3 through 5 – presents the RI scope of work followed by a description of the specific field and investigative activities that will be performed to gather sufficient information to meet the project objectives. These include geophysical surveys to characterize hydrogeologic conditions, soil, groundwater, sediment and surface water sampling to evaluate subsurface contamination and to understand potential pathways for contaminant migration. Leachate sampling and inspections of landfill stormwater and leachate management systems are also included. Additional components include drone-base survey details and protocols for decontamination and handling of investigation derived waste.
- Section 6 – lists site-specific information in regard to the community air monitoring program (CAMP) that will be put in place during intrusive activities.

- Section 7 – describes the methodology for keeping records and field documentation during this RI.
- Section 8 – describes the human health and ecological exposure assessments that will be performed as part of the RI.
- Section 9 – details components of the Feasibility Study which aid in the section of the most suitable remedial action.
- Section 10 – outlines the considerations for green and sustainable remediation for compliance with DER-31, and integration of environmentally responsible practices to employ throughout the project.
- Section 11 – describes community participation activities in relation to the Site.
- Section 12 – presents the approximate project schedule, with key milestones.
- Section 13 – provides a list of the references cited in this RIFS WP.

2. Site Description and History

This section presents a description of the Site, summary information regarding Site ownership and operational history, and summarizes the results of previous investigations.

2.1 Site Description

The Site is located in the Town of Hurley, Ulster County, New York at 1043 Dug Hill Road. The Site location is approximately 0.6 miles south of the Ashokan Reservoir and approximately 8 miles west of the Hudson River. The Site is located in a combined rural and residential area, zoned as low-density residential. A Site Location Map is provided as Figure 1.

The inactive hazardous waste disposal site (IHWDS) is a 13.01-acre Site encompassing portions of two (2) tax parcels, the majority of the Hurley Town Landfill (landfill), south of Colliers Road (Parcel ID: 47.1-3-15) and lands of the Town of Hurley west of the landfill (Parcel ID: 47.1-3-19). The Site consists of the approximately 5-acre closed landfill with an associated leachate collection system, a stream and wetland areas to the west, as well as an office building formerly occupied by the Town of Hurley Highway Department, an active waste transfer and recycling station, truck and equipment garages and salt storage structure to the south. A Site Plan is provided as Figure 2.

2.1.1 Adjacent Properties

The land area surrounding the Site consists mainly of forested woodland and single-family residences. Multiple properties located to the north of the Site along Collier Road, Wilson Road and Dug Hill Road are single-family residential in use. West Hurley Park is located on the southern adjoining property to the Site (Parcel ID: 47.1-3-11). The eastern and western adjoining properties to the Site are classified as vacant residential. The western adjoining property is owned by the Town (Parcel ID: 47.1-3-16.100). The Bluestone Wild Forest Preserve is New York State land and located to the southeast of the Site (Parcel IDs: 47.1-3-13 and 47.1-3-14). Beyond the northern residential properties, State Route 28A follows the southern extent of the Ashokan Reservoir. Tax Parcels are provided in Figure 3.

2.1.2 Critical Resources

The Ashokan Reservoir was identified on the NYSDEC Environmental Resource Mapper as a Class AA (T) source water within the Catskill/Delaware System of the New York City (NYC) Water Supply Watershed.

2.1.3 Critical Habitats

A desktop evaluation of the historic or current presence of Federal and/or State-listed endangered, threatened, special concern, proposed or candidate species, or habitat to support those species located in the vicinity of the project area. Information was obtained from U.S. Fish & Wildlife Service (UFWS) Information for Planning and Consultation (IPaC) system and the NYSDEC Environmental Resource Mapper. Endangered species identified by IPaC two endangered species with the potential to occur in the project area: the Indiana bat (Myotis sodalis), Northern-long eared bat (NLEB; Myotis septentrionalis), and one proposed endangered species with the potential to occur in the project area: the Tricolored bat (Perimyotis subflavous). In regard to these three species, the project location does not overlap the associated critical habitat, or no critical habitat has been designed for the species. The NYSDEC Natural Resource Mapper indicated the project area is in the vicinity “Bats Listed as Endangered or Threatened,” which was reflected in the IPaC database.

In addition, one proposed threatened insect was identified with potential to occur in the project area, the monarch butterfly (Danaus plexippus). The proposed critical habitat for this species does not overlap with the project location.

2.2 Site History

Historical information pertaining to the Site was sourced from the Site Characterization (SC) Investigation Report prepared by Crawford & Associates (C&A), dated July 2023 (Appendix C). The information provided in the SC was used to refine the proposed scope of work for this RIFS WP.

The Site historically operated as a municipal solid waste (MSW) landfill from the 1960s to the 1990s. During this period, records indicate the disposal of MSW, construction and demolition (C&D) debris, brush, logs and metal filings. It has been reported that when the landfill began operations, waste was placed directly onto the soil and bedrock surface without a protective liner.

Landfill closure activities were conducted in the 1990's by Lawler, Matusky & Skelly Engineers (LMS) on behalf of Morris Associates and the Town. Closure activities included an investigation and their recommendations included the installation of an engineered cover system, a passive gas venting infrastructure comprising of gas vents and a gas venting trench, and a leachate collection system. The leachate collection system below the cap was constructed in approximately 1998 along the western edge of the landfill and includes 548 linear feet of perforated collection line draining into two 2,000-gallon tanks. This collection line is installed along bedrock, or a to a maximum depth of 12 feet below ground surface (bgs) (this is the case in the vicinity of Monitoring Well [MW-4]), where high groundwater was encountered during installation. A surface leachate collection system was constructed in 2001 consisting of a berm and 2 1,000-gallon tanks to capture a seep that developed post-closure. An underground storage tank (UST) with a capacity of 10,000 gallons was also installed to provide additional leachate storage capacity. Following the closure of the landfill and the installation of the surface leachate collection system, the Town has been transporting leachate off-site at the City of Kingston Wastewater Treatment Plant for treatment and disposal. According to data provided by the Town, in 2024 a total of 472,200 gallons of leachate were hauled offsite in 73 trips.

Between 2006 and 2007, the Town installed a stormwater conveyance system to manage runoff from the landfill cap directing it to a drainage swale in attempt to reduce volume of leachate generated. In 2012 it was reported that groundwater in downgradient monitoring wells contained higher concentrations of inorganics and some heavy metals when compared to an up-gradient well. From 2013 to 2021, annual monitoring was not completed at the landfill. In 2017, groundwater sampling was performed by the NYSDEC Division of Materials Management (DMM), which identified PFAS (PFOA and PFOS) and 1,4-dioxane in multiple monitoring wells. Additional sampling was conducted by NYSDEC in downgradient residential supply wells between the years 2018 and 2020, the result of which confirmed the presence of PFAS contamination.

2.2.1 Notice of Violation

In January of 2022 a Notice of Violation (NOV) was issued to the Town of Hurley Landfill for multiple violations of 6NYCRR Part 360 Solid Waste Management Facility regulations observed during an inspection of the Site. The Town was directed to cease the discharge of leachate into the environment and begin disposal at an authorized facility (City of Kingston Wastewater Treatment Plant began accepting leachate from the Site). An Order on Consent and Administrative Settlement was executed between the NYSDEC and Town of Hurley in February of 2022. In early 2022, general maintenance and improvements were made to the system. This included clearing vegetative overgrowth, performing the inspection of and/or repairing tanks, containment areas and the surface leachate collection system. Inspection of the tanks revealed a lack of secondary containment for both 1,000-gallon tanks, possibly including the 10,000-gallon tank, as well as liquid observed in the secondary containment of the 2,000-gallon tanks.

2.2.2 Spill Incidences

According to the records search 2023 C&A SCI Report, the Highway Department area has one open and three closed underground storage tanks. (UST PBS – NY: Facility ID NY33333). Three spills have been reported to the NYDEC Spills Database as follows:

- NYSDEC Spill Number 9806705, Spill Date August 31, 1998: The cause of this spill is identified as a tank failure. During tank removal activities (1,000-gal diesel fuel tank), contaminated soil was encountered and stockpiled. The amount of material spilled is listed as 0 gallons. Spill Closure Date is listed as May 14, 1999 & cleanup work is listed as not meeting state standards.
- NYSDEC Spill Number 9908569, Spill Date October 14, 1999: The cause of this spill is identified as abandoned drums which impacted a small stream. A citizen reported that two 275-gallon petroleum tanks were dumped behind the highway garage in the recycling center and that the tanks were leaking material which was running into a small stream and nearby swamp area – caller was concerned that the Town may bury the tanks on-site. Spill Closure Date is listed as December 30, 1999 and state standards are listed as having been met.
- NYSDEC Spill Number 2006990, Spill Date November 2, 2020: As described by NYSDEC, this was an administrative spill generated to provide a mechanism for the provision of alternate water supplies to residential homes impacted by PFOA and/or PFOS contamination, as directed by the Department of Health, identified through the Inactive Landfill Initiative sampling program.

2.2.3 Existing Groundwater Monitoring Wells

A total of 11 monitoring wells are currently situated at the Site. MW-1, MW-3, MW-6A, and MW-7 were installed by American Auger Drilling under LMS in 1991 as part of the landfill closure activities. The original MW-4 was installed in 1991, but was replaced and drilled 65 feet southwest from the original by Boyd Artesian Well Inc. in 1996. AECOM could not obtain well construction data for MW-6B, which is situated next to MW-6A. MW-8 though MW-11 were installed by Core Down Drilling under C&A as part of the 2023 SCI. MW-1 is located up-gradient and southeast of the landfill. Historical monitoring well MW-2 was abandoned and removed in 1996, and current MW-11 was installed near its location, to the southwest of the landfill and near a wetland area. MW-10 is located to the south of the gas venting trench, directly south of the landfill. All remaining wells (MW-3 through MW-9) are located downgradient of the landfill. Monitoring well locations are shown in the Site Plan (Figure 2). Monitoring well construction details are included as Table 1.

2.3 Previous Investigation Work

The following summary of available sampling information for the Site has been cited from the SCI Report prepared by C&A, dated July 2023.

2.3.1 Landfill Closure Investigation Report - 1991

This 1991 Closure Investigation Report (CIR) was performed by LMS and Morris Associates on behalf of the Town, to satisfy the landfill closure requirements under 6 NYCRR Part 360. As part of the CIR, various investigations were performed, which included a hydrogeologic and leachate investigation, structural and glacial geology determinations, a fracture trace analysis, and provided recommendations for the closure of the Landfill including post closure monitoring.

As indicated in the CIR, the laboratory results for the monitoring wells and surface water samples collected did show that the landfill had impacted both groundwater and surface water quality. However, they concluded that the contaminants that were detected were common to landfill leachate and did not suggest the presence of other contaminants.

In this report, the landfill waste mass was described with a footprint of 4.7 acres, an estimated depth at 30 feet in the central portion of the footprint with an average depth of 21 feet and tapering toward the northern and western edges of the landfill.

2.3.2 Annual Landfill Monitoring Report 2012

Based on a review of the Annual Landfill Monitoring report results for calendar year 2012, monitoring well results suggest leachate contamination in the downgradient direction, with three monitoring wells (MW-4, 6A and MW-7) exhibiting chemical concentrations higher than MW-1, which is representative of the background level. The groundwater contamination was reported to be limited mainly to inorganic parameters, and some heavy metal contaminants. The stated inorganic and metal analytes were not specified in the C&A SCI report.

2.3.3 NYSDEC Division of Materials Management, Inactive Landfill Initiative – 2017

Emerging contaminant (EC) sampling was completed by the NYSDEC Division of Materials Management under the Inactive Landfill Initiative (ILI) in October 2017, which included the collection of 3 groundwater samples from existing monitoring wells (MW-1, MW-4 and MW-6A). Groundwater EC results were as follows:

- MW-1: PFOA at 1.1 parts per trillion (ppt) or nanograms per liter (ng/L). PFOS and 1,4-Dioxane were not detected (ND).
- MW-4: PFOA at 190 ppt, PFOS of 330 ppt and 1,4-Dioxane at 0.47 parts per billion (ppb) or micrograms per liter (µg/L).
- MW-6A: PFOA at 190 ppt, PFOS at 240 ppt and 1,4-Dioxane at 1.5 ppb.

2.3.4 Private Well Monitoring and Results 2018 – 2024

Based on information provided by the NYSDEC to AECOM for this RIFSWP, PFAS compounds were detected in 4 nearby residential water supply wells (out of 23 locations sampled). PFOA detections above the NYS drinking water maximum contaminant level (MCL) of 10 ng/L or ppt ranged from 12.9 ppt to 23.3 ppt and PFOS detections above the MCL from 11.2 ng/L to 23.3 ppt, which concentrations could be attributable to current or past operations on the landfill property. Those residences impacted have been provided with an alternate water supply in the form of a point of entry treatment (POET) system or bottled water.

2.3.5 Annual Landfill Monitoring - 2022

In 2022, the Town re-engaged C&A to assist with resuming annual landfill monitoring activities. C&A's monitoring activities have been limited to onsite and offsite groundwater and surface water. The monitoring locations included monitoring wells: MW-1, MW-3, MW-4, MW-6A & MW-7; surface water: SS-3, SS-5 and Betty & Ray's Stream (opposite of 689 Rt 28A); and nearby residential locations.

Based on the 2022 monitoring results groundwater and surface water exceedances at the Site appear to be similar to the data obtained during the 2012 monitoring activities, according to C&A. Inorganic leachate contamination influence was detected in the down-gradient direction; however, C&A stated the levels reported did not appear to warrant significant concern. Nearby residential well data was obtained during the 2022 sampling effort. Data from the two locations that were sampled, have concentrations of some of the constituents sampled at levels that are greater than that which has been detected in the landfills' upgradient monitoring well (MW-1). Constituents detected in the two residential wells sampled include total dissolved solids, manganese, iron, and sodium. At the time of writing this work plan it is unclear if EC sampling was performed during the 2022 monitoring activities.

2.3.6 Site Characterization Investigation Report - 2023

As required by NYSDEC consent order CO 3-20211220-61 described in Section 2.4, C&A performed a SCI between November 2022 and July 2023 to characterize contamination at the site and to allow NYSDEC and NYSDOH to determine if the site presented a significant threat to public health or the environment. The SCI involved the installation of four bedrock wells, and sampling of groundwater, surface water, soil, sediment and leachate. Investigation results confirmed the presence of PFAS in the landfill and in six of the ten groundwater samples collected. Other exceedances were limited to 1,4-dioxane and several metals such as iron, sodium and aluminum. Further information on the 2023 C&A investigation is included in Section 2.3 of this work plan. The following presents a summary of the findings of the C&A SCI Report:

PFOA and PFOS were detected in both groundwater and in surface water samples at several locations exceeding both NYSDEC TOGs 1.1.1 guidance values and NYS drinking water MCL, with MW-4 showing the highest detected PFAS concentration in groundwater at 147 ng/L (PFOA) and 286 ng/L (PFOS). 1,4-dioxane was detected in groundwater at a concentration of 1.63 ug/L, exceeding both the NYSDEC TOGs 1.1.1 guidance value (0.35 µg/L) and the New York State Department of Health (NYSDOH) Maximum Contaminant Levels (MCL) (1 µg/L). It was also detected in two down-gradient surface water samples above the 0.35 ug/L guidance value. Two Semi-volatile Organic Compounds (SVOCs) constituents benz(a)anthracene and benzo(b)fluoranthene were detected at 0.0588 ug/L, exceeding their NYSDEC guidance values of 0.002 ug/L. Several metals concentrations exceeded NYSDEC guidance values in both surface and groundwater samples. There were minimal detections of Volatile Organic Compounds (VOCs) and no detectable concentrations of cyanide, Polychlorinated Biphenyls (PCBs), herbicides of pesticides in both the surface and groundwater samples collected.

In soil, PFOS was detected above the NYSDEC guidance value (0.88 µg/kg) at MW-10 (1.79 µg/kg) and MW-11 (1.61 µg/kg), but below the Residential Use (8.8 µg/kg) and Protection of Groundwater (3.7 µg/kg) values. Other contaminants were minimal or not detected. Detected concentrations of lead (68.4 mg/kg) and zinc (1,140 mg/kg) at MW-10 exceeded Unrestricted Use and ecological resource guidance values but remained below Protection of Groundwater and restricted residential use values.

In sediment, PFAS (PFOA, PFOS) were detected in downstream locations, with the highest PFOS concentration at SD-3 (10.2 µg/kg), where sediment was observed to pool and settle from upstream. Additional PFAS (N-ethyl perfluorooctane sulfonamide [N-E+Fosaa], Perfluorotridecanoic acid [PFTrDA], Perfluorobutanoic Acid [PFBA]) were also detected at SD-3, with N-E+Fosaa at a concentration of 2.18 µg/kg. One upstream location (SD-1) had a detected concentration of PFtrDA at 0.413 µg/kg. Arsenic at SD-3 (37.9 mg/kg) exceeded the NYSDEC “Class C” – High Risk guidance value (>33 mg/kg). Potential “Class B” metals (arsenic, copper, lead, nickel) were found at SD-3 and SD-5, though copper at SD-5 may be lab contamination. VOCs, SVOCs, cyanide, PCBs, herbicides, and pesticides were minimal or not detected.

Based upon the findings of the C&A SCI report, it was determined by NYSDEC and NYSDOH that the site met the criteria for placement on the Registry of Inactive Hazardous Waste Disposal Sites (Registry) as a Class 2 site.

Figures 4 through 8 present the groundwater countours, groundwater exceedances, surface water exceedances, sediment results summary and soil exceedances, respectively, as reported by C&A in the SCI. The full 2023 SCI Report by C&A is included as Appendix C of this RIFS WP.

2.3.7 Annual Landfill Monitoring – 2024

In 2024, the Town engaged C&A to collect and submit the required annual groundwater and surface water monitoring data at the Site. The monitoring locations included monitoring wells: MW-1, MW-3, MW-4, MW-6A & MW-7; surface water: SS-3, SS-5 and Betty & Ray’s Stream (opposite of 689 Rt 28A); and 4 nearby residential wells.

The 2024 monitoring results appear to be similar to the data generated in prior years, according to C&A. Inorganic leachate contamination influence was detected in the down-gradient direction; however, the levels reported did appear to warrant significant concern. Nearby residential well data was obtained during the 2024 sampling effort. Data from the 4 locations that were sampled indicated concentrations of some of the constituents at levels greater than was detected in the upgradient monitoring well (MW-1). Constituents detected in the two residential wells sampled include total dissolved solids, chloride, manganese, and sodium.

2.4 Consent Orders

On February 7, 2022, NYSDEC and the Town of Hurley entered into an Order on Consent and Administrative Settlement (Index No. CO 3-2021-11220-61) ordering the completion of the SCI Work Plan, which led to the aforementioned SCI performed by C&A between November 2022 and July 2023. The findings of the SCI resulted in the Hurley Town Landfill to be listed as a Class 2 IHWDS (NYSDEC Site No. 356062).

On July 1, 2025, based on the Class 2 IHWDS listing and the recommendations of the C&A SCI Report, NYSDEC issued a subsequent Order on Consent (Index No.CO 3-20250310-57). This CO ordered the Town to further define the nature and extent of contamination at the Site, agreeing with the conclusions of the C&A SCI Report that an RIFS is required at the Site. This RIFS WP has been prepared in response to the July 2025 CO.

2.5 Site Physical Characteristics

Information obtained during the previous investigations performed at the Site pertaining to surface water, topography, geology, and hydrogeology is summarized in the following sections.

2.5.1 Surface Water

Multiple national wetlands (NWI) are present at and surrounding the Site. To the northwest, a freshwater pond is located just beyond the Site boundary but extends eastward into an on-Site wetland area. This pond flows to an unnamed creek, classified as a riverine wetland, which runs along the west side of the landfill. The unnamed creek then connects to a 0.95-acre freshwater emergent wetland, to the south-southwest of the landfill.

As indicated by LMS in the previously mentioned 1991 CIR, surface water located in and around the Hurley Landfill are Class D surface waters, applicable to the protection and propagation of fish. The small brook that flows north along a ravine on the southeast side of the landfill and meanders to the east, where it eventually feeds the Praymaher Brook, is a class C(T) surface water, applicable to the protection and maintenance of fish species including the family Salmonidae. Surface water features are included in Figure 2 (Site Plan).

2.5.2 Site Topography and Drainage

The Site area is mapped by the U.S. Geological Survey (USGS) in the 7.5-minute Hurley quadrangle and the topography of the area surrounding the Site is generally a region of rolling, undulating and hilly terrain in the southeastern foothills of the Catskill Mountains. The elevation in the area ranges from approximately 60 to 700 feet above mean sea level (amsl), with the landfill itself situated on moderately elevated ground at approximately 600-650 feet amsl. The topography of the landfill waste mass and cap forms a domed profile with sloped sides. Beyond the eastern boundary of the Site, a ravine drops approximately 125 feet in elevation where it meets an unnamed stream.

As indicated in the SCI Report by C&A, the Site is located in the northeastern extreme of the Allegheny Plateau Physiographic Province. Topographical features of the Allegheny Plateau in New York were

formed by Devonian rock deposits. Glacial lake deposits were left behind such as sand, silt, clay, and other ancient shoreline deposits.

The U.S. Department of Agriculture's Soil Conservation Service (USDA Web Soil Survey, 2025) designates the Site and surrounding area primarily as Arnot-Lordstown-Rock Outcrop Complex, which features moderately steep to sloping terrain. Smaller portions of the area include made land, Morris-Tuller complex (gently sloping, very bouldery), a quarry, and the Rock Outcrop-Arnot Complex, which has slopes ranging from 25% to 70%,

Additionally, a stormwater conveyance system installed in 2007 collects runoff from the landfill cap and directs it to a drainage swale on the western portion of the Site, which flows towards an unnamed stream that eventually discharges into the Ashokan Reservoir.

2.5.3 Site Geology

The local and regional geologic setting of the Site is mapped on the Geologic Map of New York State Lower Hudson Sheet, Map and Chart Series No. 15 (Bedrock) and No. 40 (Surficial) and is defined by sedimentary bedrock formations of Devonian age rocks of the Hamilton Group, which primarily consists of shales, siltstones and sandstones. These units are part of the Catskill Delta complex, which were deposited in ancient river deltas and shallow seas, and reflect a history of fluvial deposition. Overlying the bedrock are surficial deposits of glacial origin, including till and outwash, which vary in texture and thickness across the site from 0 to 10 feet bgs. The underlying carbonate rocks of the Helderberg and Onondaga Groups serve as the foundation for the thick sedimentary layers of the Catskills.

LMS and Morris Associates described glacial deposits in regional and local setting in the 1991 CIR as follows:

> *The study area was heavily glaciated during the Pleistocene Epoch, with the most recent glacial period being the Wisconsin glaciation occurring about 11,000-8,000 years ago. Glacial retreat began approximately 16,000 years ago, depositing sediments in meltwater from glaciers. These sediments compose the overburden materials at the Site. As the Site area is situated in moderately high elevation, the glacial overburden is not of great thickness. Horizontal "sheeting" fractures are also present, which tend to be a result of sudden load or pressure unloading and typically within 15 feet of the surface.*

2.5.4 Structural Geology

The 1991 CIR by LMS and Morris Associates also provides a summary of the site's structural geology as follows:

> *The most significant structures at Hurley are undoubtedly the joint sets which are readily observable in outcrop and on stereo aerial photographs as topographic lineations. Field inspection of outcrops in the study area indicates the presence of a pronounced joint system composed of two joint sets (fracture sets). Analysis of numerous attitude measurements taken from these joints reveals one set with an average strike of N 24.5°E (north-south set) and another with an average strike of N 71°W (east-west set). The dips of both of these fracture sets cluster around 90°, i.e., they are basically vertical. The dips for the north-south set range on the average 5° in either direction from the vertical. The east-west set dips range on the average 12° in either direction from the vertical. The joint spacing is fairly regular, about every 20 to 30 feet.*
>
> *These two nearly vertical joint sets are interpreted as shear fractures due to lateral compression of the Catskill rocks. The direction through which the greatest compressive force was applied upon the rocks at the Site is computed to be along a vector-oriented N 67°E. In this model, the least compressive force was also in a lateral direction, oriented along a line trending E 67°S. The intermediate compressive force was in the vertical direction and constituted the load pressure of the overlying rocks.*
>
> *A third set of joints is evidenced in the rock at Hurley. These are release fractures developed in a*

horizontal plane, as a response to the release of a vertical load, or compressive force. This phenomena is well-known in quarries where it is called 'sheeting.' Large amounts of rock have been removed relatively quickly, and the rocks 'unload' creating horizontal joints. This mechanism has been found to be active at the Site, proven through core inspection. The horizontal fractures are present generally only to a depth of 15 feet bgs.

2.5.5 Site Hydrogeology

Based on the 2023 C&A SCI Report, groundwater was found at elevations ranging from 569.23 to 638.72 feet amsl or 4.7 to 72 feet below ground surface (ft.bgs). Groundwater flow has been determined to be in a northwesterly direction in what could be described as a local shallow aquifer flowing towards the Ashokan Reservoir to the northwest. As discussed further below, a deeper regional groundwater aquifer that generally flows towards the Hudson River to the east. Given the limited thickness of overburden on the site (0 to 10 ft. bgs), groundwater is primarily present within the bedrock in existing wells with the exception MW-4 and MW-8, where the static water level was measured within overburden material at 4.7 and 5.25 ft. bgs, respectively.

A hydrogeologic investigation completed for the Site in the 1991 CIR by LMS and Morris Associates, for which an excerpt of its findings is provided below:

This investigation confirmed that the Hurley landfill was developed in a former quarry, and that waste material was placed directly onto the bedrock surface. Groundwater depth measured during the Site investigation was approximately 15 feet from the surface. Hydraulic conductivities within the monitoring wells that were installed within the fractured bedrock at the time of the hydrogeologic investigation ranged from 6.617 x 10-6 to 1.841 x 10-2 cm/sec. Groundwater flow is influenced by both local topography and regional gradients, with flow within the shallow aquifer directed northward toward the Ashokan Reservoir and flow within the deeper aquifer directed southeastward toward the Hudson River. MW-1, located near the southeastern edge of the landfill and in the vicinity of a ravine, exhibited a southeastward flow direction due to its position relative to the local water table crest. In contrast, MW-2 and MW-5, situated in closer vicinity to the crest of the ridge-like hill, recorded higher water table elevations and a northeast slope. The aquifer is primarily in fractured bedrock with low primary porosity, and permeability is governed by structural features such as vertical joints and bedding planes. The landfill's elevated position and complex fracture system contribute to varied groundwater flow patterns across the site.

3. Remedial Investigation Scope of Work and Field Activities

The following activities are proposed to be completed during the RI to fulfill the project objectives listed in Section 1 and address existing data gaps. The locations of each of the proposed RI sample points are presented in Table 3 and on Figure 9.

- Further review of historic documents related to landfill closure activities to better understand how existing man-made infrastructure (landfill engineered cover system, subsurface and surface leachate collection systems, post-closure stormwater conveyance system) are impacting leachate generation, collection and potential off-site migration.
- An inspection of Site infrastructure, including the leachate systems, holding tanks and stormwater conveyance system around the landfill, including a video inspection performed by a subcontractor under AECOM's supervision. See Section 3.2.
- Drone thermal infra-red mapping of the landfill performed to identify potential water/leachate discharge points from the landfill to the surrounding areas. See Section 3.3.
- Subsurface utility mark-out with Ground Penetrating Radar (GPR) and other technologies performed by a subcontractor under AECOM's supervision prior to drilling. See Section 3.1.3.
- Collect soil samples from overburden soils (if encountered) in new monitoring well locations and three (3) locations (SB-1 through SB-3) downgradient from the leachate collection system (LCS). See Section 3.5.
- Downhole geophysical data collection to determine stratigraphic variations and possible water bearing bedrock fractures of in all proposed well locations and up to five (5) existing well locations. See Section 3.6.
- Installation of seven (7) new monitoring wells (MW); three (3) MWs up to 50 feet below ground surface (bgs) and four (4) MWs up to 100 feet bgs. See Section 3.7.1.
- Complete redevelopment of existing and new monitoring wells using standard development methods (18 groundwater samples total). See Section 3.7.2.
- Survey monitoring wells, leachate sample points, water/sediment locations, and other relevant environmental and infrastructure related features. See Section 3.7.3.
- Collect groundwater samples from existing and new monitoring well locations (18 groundwater samples total). Collect groundwater levels from all wells to evaluate the direction of groundwater flow. See Section 3.7.4.
- Slug tests are proposed to be conducted at five locations, at three shallow wells (MW-4, MW-13S, MW-14S) and two deep (MW-4D and MW-5D). See Section 3.7.5.
- Collect eight (8) sediment and surface water samples from selected areas along the on-site and off-site riverine and pond. See Section 3.8.
- Collect one (1) leachate sample from a selected holding tank. See Section 3.9.
- Analyze soil, groundwater, sediment, surface water and leachate samples according to Section 3.4, Table 3 and quality procedures set forth in the QAPP:
- Properly decontaminate equipment, manage and dispose investigation-derived waste (IDW). See Section 5.

- Conduct Community Air Monitoring during intrusive activities. See Section 6.

3.1 General Planning and Preparatory Field Activities

3.1.1 Site Reconnaissance

AECOM staff performed a site visit on July 22, 2025. The purpose of the site visit was to observe on-site features and site conditions to refine the scope of work of the RIFS WP; meet relevant staff to generally understand site features, existing conditions and project background; and assess site access for field equipment to during the RI. Staff present during the Site visit included the Town of Hurley Supervisor and Highway Department staff, C&A staff and the NYSDEC Project Manager. On-site features and areas observed included: LCS, gas venting system, landfill cap, stormwater conveyance system and discharge locations, riverine wetland (unnamed stream) and surface water pond west/northwest of the site and off-site locations proposed for sampling. Proposed sampling locations were observed and georeferenced. This site visit did not constitute a formal inspection of the integrity of the landfill features. Site photographs obtained during the July 22, 2025 site visit are presented in Appendix D.

The more salient observations and/or information gathered during the site visit are presented herein:

- LCS has been modified to adapt to on-site conditions and needs. Per Town of Hurley staff, approximately two (2) loads of leachate are transported to the Kingston Wastewater Treatment Plant (WWTP) weekly (6,000-7,000 gallons per load).
- A ponding/wet area was observed near the two (2) inactive 1,000 gallons storage tanks. Based on this observation, AECOM identified this area as a new sampling location.
- A large area covered by phragmites was observed in the leachate control area, west of the landfill access road. Clearing portions of this area might be warranted prior to RI sampling activities.
- Gravel with red coloring was observed near the leachate control area, east of the landfill access road. The cause of the coloring is unknown and might warrant further assessment. No other staining or discoloration was observed on-site.
- No significant sheen was observed in the standing water in the leachate collection area, tanks catch basins or riverine wetland. However, significant turbidity and a brownish to reddish hue was observed in the riverine wetland/drainage swale along/near the western Site boundary.
- No odors indicative of field evidence of contamination were noted.
- The landfill cap and gas vents appeared to be in good condition.

AECOM observations are reflective of site conditions as of the time of the site visit. Relevant observations of the site visit have been incorporated throughout this RIFS WP. Proposed sampling locations were adjusted, accordingly, based on site features and conditions at the time of the site visit.

During a subsequent site visit held with the Town Highway Superintendent on August 1, 2025, the salt storage shed was described as being built on top of tires and quarry rubble, which is likely causing subsidence and structural issues with the building. The presence of the fuel tanks mentioned in Section 2.2.2 was discussed and the plan was to decommission or retrofit them. The Superintendent additionally mentioned that the unoccupied Highway Department office building has likely experienced vapor intrusion from the landfill waste mass into the building. Vapor intrusion will be considered in the Qualitative Exposure Assessment to be performed as part of the RI report.

3.1.2 Mobilization

Following authorization to proceed with the field investigation from NYSDEC and the Town of Hurley, AECOM and its subcontractors will mobilize necessary materials and equipment to the Site. Because the project involves intrusive work (e.g., drilling, monitoring well installations, etc.), a call will be placed to UDig NY by the subcontractor performing the intrusive work. Utility clearance is detailed in Section 3.1.3.

Access to the site is available via Collier Road and via Dug Hill Road, through the portion of the site occupied by the municipal buildings. An internal landfill access road, which starts and ends at the municipal buildings area (surrounding the landfill), provides access to most of the proposed sampling areas. A temporary decontamination pad and drum storage area will be established at a suitable area of the Site. Vehicle access routes to sampling locations off the landfill access road or municipal buildings area will be cleared and grubbed prior to field activities, as able. Clearing and grubbing will be performed by the Town of Hurley. Access to off-site sampling locations will be coordinated and arranged by the Town of Hurley.

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the Site and to familiarize all Site workers with Site background; potential dangers; health and safety requirements; and emergency contingencies and other field procedures.

It is anticipated that the work will be performed in Level D personal protection with the potential to upgrade to Level C if required. Field workers will be instructed to keep Level C equipment available should it be needed. Should health and safety monitoring during field activities indicate a need to upgrade beyond Level C protection, work will stop and Site conditions will be re-evaluated by NYSDEC and AECOM. An upgrade to Level B protection will require modification of the HASP and review by the AECOM regional safety manager. A copy of the HASP is provided as Appendix B.

3.1.3 Underground Utility Clearance

Prior to commencing any intrusive activities, the drilling subcontractor will contact U Dig NY to mark out utilities in proposed investigation areas. AECOM will mark the intended drilling locations with spray paint or flagging and hire an independent utility mark out subcontractor to locate utilities in drilling areas not covered by the U Dig NY. If necessary, based on utility locations, monitoring well locations or other sampling locations will be modified in consultation with the Town and NYSDEC.

Geophysical surveys will be conducted to obtain information on subsurface conditions or features, in addition to locating utilities or obstructions. GPR will be the method utilized in this investigation. GPR utilizes high frequency radio waves to acquire subsurface information. From a small antenna, which is moved slowly across the ground surface, energy is radiated downward into the subsurface. This energy is then reflected back to the receiving antenna, where variations in the return signal are continuously recorded. This produces a continuous cross-section of the shallow subsurface conditions. Radar responds well to the different electrical properties between rock units, soils, groundwater, and most importantly for this application, buried pipes, utilities, and foundations. GPR will also be used to locate the extent of the leachate collection UST.

At the start of intrusive fieldwork, clearance of underground utilities will be performed using non-mechanical means. An air knife and vacuum, hand auger, or equivalent will be utilized to advance each boring from the ground surface to approximately 5 ft to prevent disruption of any potential underground utilities. Excavated soil will be containerized in either 55-gallon drums or a roll-off container and staged on-site until proper disposal at a permitted facility.

3.1.4 Site Survey

Maps containing site boundary and topographic information were prepared by C&A (October 1996) and subsequently updated by Brinnier and Larios P.C. (March 2006 and January 2023). It is assumed that the most recent map in electronic format (computer assisted drafting [CAD]) is readily available and will be used as a base map for future updates. Relevant site features and selected topographic information will

be confirmed and updated, as warranted. Following (or during, as needed) the field data acquisition phase of work, the locations of all investigation points will be surveyed and included in the existing survey. Furthermore, additional information from the drone-based thermal imaging will be incorporated into the survey, as warranted.

The updated survey will be completed by a NYS-licensed professional land surveyor. The horizontal positions will be tied into the North American Datum 1983 (NAD83) New York State Plane West.

The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88). Any measuring points associated with the existing monitoring wells or other Site reference features will be recorded to a vertical accuracy of 0.01 ft. The final survey will be prepared in a digital CAD format (i.e., .dwg or .dxf files in the cited coordinate systems).

3.2 Inspection of Landfill Drainage and Leachate Management Infrastructure

As part of the RI, a comprehensive inspection of the landfill's stormwater and leachate management systems will be conducted to assess their current condition, functionality, and potential contribution to contaminant migration. This inspection will include the following:

3.2.1 Stormwater Conveyance System

A closed-circuit television (CCTV) video inspection will be performed on all accessible stormwater lines and associated structures (e.g., catch basins, manholes, culverts). The objective is to:

- Identify structural defects (e.g., cracks, joint separations, blockages).
- Assess sediment accumulation and flow obstructions.
- Evaluate potential cross-connections with the leachate collection system.

Inspection will follow applicable standards to ensure consistent assessment of infrastructure conditions and documentation.

3.2.2 Leachate Collection System

The leachate collection system, including lateral and main conveyance piping, cleanouts, and manholes, will be inspected using CCTV and/or push camera systems. Leachate collection pipes will be inspected to assess whether these conform to 6 CRR-NY 363-6.11 Leachate collection pipes requirements. The leachate collection pipes will be inspected in accordance with the inspection requirements specified in the "Post-Closure Monitoring and Facility Maintenance Manual" (prepared by C&A, dated June 20, 1996) and the Record Drawing for the Surface Leachate Collection System (prepared by C&A, dated January 3, 2001 and last revised March 9, 2001). The inspection will:

- Verify system integrity and identify any signs of infiltration/exfiltration.
- Assess sediment buildup or biological fouling.
- Confirm flow direction and connectivity to leachate holding infrastructure.

Where feasible, flow testing or dye tracing may be used to confirm hydraulic connectivity.

3.2.3 Leachate Holding Tanks

Underground leachate holding tanks will be inspected to assess whether these conform to 6 NYCRR 363-6.20 Aboveground and on-ground leachate storage tank requirements. The leachate holding tanks will be

inspected in accordance with the inspection requirements specified in the "Post-Closure Monitoring and Facility Maintenance Manual" (prepared by C&A, dated June 20, 1996) and the Record Drawing for the Surface Leachate Collection System (prepared by C&A, dated January 3, 2001 and last revised March 9, 2001). The inspection will include:

- Records for off-site disposal of the leachate for the year 2025 to understand recent leachate generation capacity.
- Internal and external visual inspection (where access is available).
- Ultrasonic thickness testing (UTT) of tank walls and bottoms.
- Evaluation of tank appurtenances (vents, level sensors, overflow protection, monitoring points, and alarms).
- Assessment of tank content type and volume at the time of assessment.
- Review of secondary containment integrity.

If entry into tanks is required, confined space entry procedures will be followed in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1910.146, and all inspections will be conducted by qualified personnel.

3.2.4 Additional Site Features

Other landfill infrastructure components such as gas collection piping, drainage swales, and surface water control structures will be visually inspected and documented. Observations will be recorded using standardized field forms and georeferenced photographs.

3.3 Unmanned Aircraft System (Drone) Survey

AECOM proposes to fly an area of approximately 30 acres at the Site and its vicinity using a UAS (Unmanned Aircraft System; i.e. drone) equipped with a thermal sensor. The primary goal of the UAS (drone) flights is to identify potential groundwater seeps from the landfill by detecting thermal gradients across the site. This assessment aims to improve understanding of site hydrology and help determine whether any identified seeps contribute to surface water flow and discharge, which will inform the FS and evaluation of remedial alternatives. In addition to thermal imaging, the drone will capture high-resolution Red, Green, Blue (RGB) imagery to support the assessment of site features and conditions. The following section outlines the detailed procedure for conducting the UAS survey.

3.3.1 UAS Planning and Coordination

- Perform desktop site investigation to identify Federal Aviation Agency (FAA) airspace, review local/municipal laws and regulations, and to identify potential hazards
- Coordinate with the project design team to review the site, verify the area of interest (AOI), pre-identified groundwater seepage for data validation, ideal temperature conditions for data capture, and coordinate with client for site permissions
- Perform flight planning, which includes:
  - Establishing the AOI in the UAS flight control software and identifying potential launch and recovery positions
  - Perform risk assessment considering the airspace, site layout, weather forecast, type of operation, UAS system, and flight crew
  - Propose schedule of flight operations
  - Coordinate schedule with design team and client staff

- Mobilize equipment including maintenance checks on required equipment, updating firmware as needed, charging batteries, etc.

3.3.2 Flight Operations

- All UAS operations will be performed in accordance with 14 CFR Part 107, state/local regulations, AECOM's Commercial UAS Operations Manual, and AECOM SH&E Policies and Procedures. All UAS operations will be staffed with a Part 107 UAS pilot and trained visual observer.
- Prior to traveling to the project site, the flight crew will review the weather forecast and check for any temporary flight restrictions (TFRs) or notice to airmen (NOTAMs). If the weather forecast is prohibitive (i.e. forecast for strong winds or precipitation) or TFRs and/or NOTAMs prohibit the operation, the proposed work will be rescheduled.
- Check in with Site staff and perform a safety meeting once on site.
- Perform Site walk to confirm expected hazards as well as launch and recovery positions. Update risk assessment and mitigation as needed.
- Perform pre-start flight checklist to verify airspace, weather, flight crew, site obstructions, drone and equipment settings, and equipment condition.
- Perform in-flight prechecks at low altitude to verify fully functional flight controls
- Perform flight operations
  - Flight operations may be restricted by weather conditions. Rain and winds greater than 15 miles per hour (mph) will result in flight operations being postponed until more favorable conditions are present.
  - Multiple launch/recovery positions will be utilized as needed to minimize horizontal flight distances and improve visual line of sight.
  - Drone data capture will be performed using automatic flight mission software, such as DJI Pilot as follows:
    - Drone is anticipated to be flown at 200' above ground level (AGL)
    - Drone will travel at 7 mph or less
    - Front and side overlap are anticipated to be captured at 75%
    - Sensor will capture imagery at -90 degree angle (nadir)
    - Individual flight areas will typically be limited to 15 to 20 minutes of flight time
  - Drone will simultaneously capture visual RGB JPEG images and thermal radiometric JPEG images
- Complete UAS flight logs
- Review data on-site to ensure all data is collected and saved.

3.3.3 UAS Demobilization and Data Processing

- Clean and store all UAS equipment
- Review and sort data
- Provide raw imagery to project team for record keeping and reference
- Process data using Drone Deploy to develop separate visual orthomosaic and thermal orthomosaic of project Site
  - Due to limitations of thermal data processing, a complete orthomosaic image of the project site is not guaranteed; however, individual thermal photos can still be used for analyses (but may result in some additional analyses effort)
  - Temperature span (minimum and maximum temperatures) for thermal gradient to be adjusted in Drone Deploy to improve thermal contrast
  - Points of interest (temperature differentials) that may indicate groundwater seepage will be identified in Drone Deploy. Alternatively, points of interest can be identified in GIS if preferred by the project team. Ground truthing will need to be performed by the project team to confirm groundwater seepage.
  - Processed imagery can be exported and provided as GeoTiff, JPEG, and/or PDF file types
- Processed orthomosaic imagery will be imported to a Geographic Information System (GIS) map for project team use.

3.4 Analytical Program

The laboratory samples for each media and the chemical analyses to be performed, including the quality assurance/quality control (QA/QC) samples are listed in Table 3. All samples will be analyzed by a NYSDOH ELAP certified laboratory.

Field and laboratory quality control samples for the investigation will be collected and analyzed to document the accuracy and precision of the samples.

The QA/QC samples, summarized in Table 3, include trip blanks, field equipment rinse blanks, field duplicates, matrix spikes, and matrix spike duplicates. The data quality level for the investigation will be consistent with procedures outlined in the NYSDEC Analytical Services Protocol (ASP) July 2005 methodologies. Full ASP Category B data packages will be prepared by the laboratory for all samples. The data will be reviewed, and a Data Usability Summary Report (DUSR) will be prepared by a qualified chemist. To meet NYSDEC electronic data deliverable (EDD) requirements, subcontracted laboratories will be required to submit electronic deliverables in an EQuIS format consistent with AECOM standards. AECOM's database manager will be responsible for verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, boring log information, etc.), and submitting a final EQuIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

Analyze soil, groundwater, sediment, surface water and leachate samples according to Table 3 and quality procedures set forth in the QAPP:

- TAL Metals via USEPA Methods 6010 / 7470 / 7471;
- 1,4-Dioxane via USEPA Method 8270 SIM (for aqueous samples with a maximum reporting limit of 0.35 ug/L);
- PFAS via USEPA Method 1633 (for solid samples, maximum reporting limit of 0.5 ug/kg for PFOS/PFOA; for aqueous samples, maximum reporting limit of 2 ng/L for PFOS/PFOA); and
- USEPA TCL & CP-51 Semi-volatile Organic Compounds (SVOCs), including tentatively identified compounds (TICs) via USEPA Method 8270.

Selected samples (30% of all the samples per media) will also be analyzed for:

- USEPA TCL & CP-51 Volatile Organic Compounds (VOCs), including TICs via USEPA Method 8260E;
- Cyanide via USEPA Method 9012B;
- PCBs via USEPA Method 8082A;
- Pesticides via USEPA Method 8081B; and,
- Herbicides via USEPA Method 8151.

Surface water, leachate and groundwater samples will also be analyzed for routine landfill parameters as specified in 6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters. These parameters are: Total Kjeldahl Nitrogen (351.2), Ammonia-N (SM-4500 NH3B), Nitrate (300.0), Chemical Oxygen Demand (Hach 8000), Biochemical Oxygen Demand (BOD5) (SM5210B-11), Total Organic Carbon (9060A, SM5210B-11), Total Dissolved Solids (SM52540C-11), Sulfate (300.0), Alkalinity (SM-2320B-11), Phenols (420.1), Chloride (300.0), Bromide (300.1), Total hardness as CaCO3 (SM2340B), Color (Platinum-Cobalt Method) and Boron (4500-B). It is noted that several of these parameters are incorporated in the previously listed analyte lists (i.e. TAL Metals).

Additional QA/QC information is provided in the QAPP.

3.4.1 1,4-Dioxane and PFAS Sampling

Samples collected during this RI will be analyzed for 1,4-dioxane and PFAS as these are contaminants of concern for the Site. Field sampling protocols, laboratory criteria, and data quality review for these emerging contaminants are described in this RIFS WP and the QAPP.

All PFAS samples will be obtained, shipped and managed according to NYSDE guidance *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)* (April 2023). Emerging contaminant supporting guidance documentation is presented in Appendix E.

PFAS samples will be obtained first, using only HDPE bottles and lids and then segregated in a separate cooler and delivered to a NYSDOH ELAP approved analytical laboratory. Standard laboratory turn-around time [up to 14 business days] will be requested.

EPA Method 1633 will be utilized for PFAS analysis in environmental samples during this investigation due to its capability to achieve low detection limits across multiple matrices. This method, based on liquid chromatography-tandem mass spectrometry (LC-MS/MS), is designed to quantify 40 PFAS compounds in aqueous, soil, sediment, and biosolid samples.

The laboratory performing PFAS analysis under this method will be required to meet reporting limits of approximately 2 ng/L (ppt) for groundwater, consistent with current regulatory and quality assurance standards. The reporting limits for PFOA and PFOS should not exceed 0.5 ug/kg, and the reporting limits for all other PFAS should be as close to this limit as possible. Groundwater and surface water PFAS target analytes provided in the table below.

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7

Group	Chemical Name	Abbreviation	CAS Number
	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4

Per- and Polyfluoroether	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonicacid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

The reporting limit for 1,4-dioxane in groundwater should be no higher than 0.35 ug/l (ppb) and no higher than 0.1 mg/kg parts per million (ppm) in soil. EPA Method 8270 SIM will be used for samples to be analyzed for 1,4-dioxane during this RI. The analysis currently performed for SVOCs in soil is adequate for evaluation of 1,4-dioxane and in soil and already has an established SCO.

Quality control samples e.g., equipment blank, ambient blank, will be collected as summarized in Table 3. Equipment and ambient blanks will be collected with PFAS-free water supplied by the laboratory.

3.5 Soil Investigation

Soil sampling activities will include surface and subsurface soil sampling. The collection of one (1) soil sample (surface or subsurface) per sampling location is anticipated. Procedures for these activities are described below.

3.5.1 Surface Soil Sampling

Surface soil samples will be collected at each new soil boring location (SB-01, SB-02 and SB-03, areas downgradient of the LCS) and selected monitoring well locations (depending on field conditions). Surface soils will be collected from 0 to 2 inches below vegetative cover to assess human exposures to soils for non-VOC analytes, and from 0 to 6 inches below vegetive cover for VOC analytes. Surface soil samples for PFAS analysis will be collected from the 2 to 12-inch interval, consistent with the Site Characterization investigation, and as requested by NYSDEC. Sampling locations are shown on Figure 9. The specific sampling interval between the surface and 1-foot bgs will depend on field conditions and overburden thickness.

Surface soil samples will be analyzed for the Target Compound List/Cleanup Protocol (TCL/CP) -51 SVOCs, TAL metals, 1,4-dioxane and PFAS. In addition, select surface soil samples will be analyzed for TCL/CP-51 VOCs, pesticides, herbicides PCBs, and cyanide. Table 3 summarizes the soil samples to be collected including the laboratory analyses to be completed. Additional information regarding the laboratory analyses is presented in the QAPP.

The following method will be used to collect surface soil samples.

- Using a decontaminated stainless-steel trowel or by hand (protected by a chemically resistant PFAS sampling approved glove), remove rocks, stone, grass, and debris to gain access to the surface soils.
- Using dedicated equipment or a decontaminated stainless device (teaspoon, trowel, “scoopula,” or similar), transfer the exposed soils directly into the laboratory-provided sample containers. Sampling depth typically should not exceed 2 inches for non-VOC analytes and not exceed 6 inches for VOC analytes.
- Complete the label on the sample container and transfer the sample container(s) to an iced cooler.
- After collecting the sample, screen the hole with a photoionization detector (PID) for volatile organic vapors. Record readings and any significant observations such as staining, oily sheen, or odors.
- If the location is not converted to a monitoring well, place a stake in the center of the hole after backfilling as a visual indicator for subsequent surveying. Otherwise, measure the location from fixed (permanent) objects using a measuring device.
- PFAS samples will be collected prior to other samples. Samples should be collected from the 2 to 12-inch interval. Samples will be segregated from other samples in a separate cooler, to avoid contact with any other type of sample container, bottles or packaging material that may have PFAS-related content. All equipment will be decontaminated with water from a PFAS-free source.

3.5.2 Subsurface Soil Sampling

Seven (7) Subsurface soil borings (SB-04 to SB-10), to be subsequently converted to monitoring wells (MW-4D, MW-5D, MW-12S, MW-13S, MW-14S, MW-15D, and MW-16D), will be advanced to obtain information regarding the thickness and composition of the overburden (fill and/or native materials); to observe and screen subsurface soil to identify conditions that may be indicative of the presence/absence of contamination; and for the collection of subsurface soil samples for laboratory analysis.

Subsurface soil borings/monitoring well locations are shown on Figure 9. Table 2 provides a summary of information regarding existing borings and monitoring wells. Subsurface soil samples will be analyzed for the TCL/CP-51 SVOCs, TAL metals, 1,4-dioxane and PFAS. In addition, select subsurface soil samples will be analyzed for TCL/CP-51 VOCs, pesticides, herbicides PCBs, and cyanide. Table 3 summarizes the soil samples to be collected including the laboratory analyses to be completed. Additional information regarding analytical parameters is discussed in the QAPP.

Borings will be advanced manually during pre-clearing and for borings where the expected sample depth will not exceed hand augering depth (5ft bgs) by hollow stem auger (HSA) drilling methods. Soils will be continuously logged during subsurface sampling, regardless of the method selected. Typical procedures sampling from HSA borings, and soil logging are presented below.

One (1) subsurface soil sample for laboratory analysis will be collected from each soil boring (i.e. proposed monitoring well location). The interval exhibiting the most significant field evidence of contamination (e.g., elevated PID reading, odor, staining) will be sampled. If no visible sign of contamination is present, the interval just above the water table or bedrock (in the absence of groundwater) will be sampled.

An additional soil sample for laboratory analysis may be collected from any interval exhibiting signs of gross contamination upon consultation with the AECOM Project Manager.

3.5.2.1 Subsurface Soil Sampling Procedures

Soil borings will be advanced to bedrock surface. The soil samples will be collected using a split-spoon sampler advanced with an HSA rig. The general procedure for subsurface sampling from is described below.

- Record the soil boring location on the soil boring log.
- Put on a new pair of disposable powderless nitrile gloves.
- Prepare a clean surface (e.g., using a plastic sheet) onto which sampling equipment, meters, and the like can be placed; clean the equipment prior to placing on the clean surface. Clean surface materials to be PFAS free.
- Retrieve the sampler from the borehole (i.e., accept the sampler from the drilling subcontractor).
- Remove the HSA shoe and head attachments from the sampler and place the sampler on a clean surface.
- If Direct Push Technology (DPT), remove the Macrocore liner/split-spoon from the sampler and place on the clean surface.
- Score the Macrocore liner along two sides to open the liner in two nearly equal halves or open the split-spoon to expose the sample.
- Immediately screen for organic vapors using a PID and record the results.
- Measure the recovery (in inches) of soil.
- Determine which interval is to be collected for laboratory analysis.
- For PFAS samples, collect before all other samples, place into the designated PFAS approved sample jar, bag in a Ziploc bag and remove from the sampling area to a separate “PFAS only” cooler.
- If a sample is to be analyzed for VOCs, take an immediate grab sample and place into the designated container (EnCore or 4-oz glass jar).
- Collect the remainder of the interval selected for sample analysis, homogenizing the sample prior to jarring if not taken from a discrete depth interval. Homogenization will involve thorough mixing to provide a well-mixed, representative sample to the laboratory.
- If not using dedicated sampling equipment, decontaminate any tools used for homogenization before use and between samples (i.e., stainless steel bowls, spoons, or spatulas) as described in subsequent sections of this RIFS WP.
- Once homogenized, transfer the soil sample directly to the appropriate sample containers, slightly tamp-down, fill to near the top of the container, and seal with the appropriate cap.
- After the last sample has been collected, record the date and time; place the sample bottles in the cooler, on ice.
- Decontamination of split-spoon sampling equipment following the decontamination procedures in subsequent sections of this RIFS WP.

3.5.2.2 Subsurface Soil and Rock Logging

Subsurface soil logging will be conducted for borings advanced by DPT methods or by HSAs. Soil boring logs will be prepared in the field by an AECOM geologist or engineer, as borings are advanced. Boring logs will be prepared either using an electronic device (tablet) equipped with Equis Collect ® or on a standard drilling log form on loose paper with aluminum clip boards appropriate for use with PFAS sampling, an example of which is provided in Appendix F. Final logs will be transferred into an electronic boring log format.

Soil borings will be logged, with each type of material encountered being described on the log form. All relevant information in the log heading and body will be completed. If survey horizontal control is not available at the time of drilling, location sketches referenced by distances to permanent surface features will be entered into the field log forms.

Each material type encountered will be described on the log form. Descriptions of unconsolidated materials will include Unified Soil Classification System (USCS) in accordance with ASTM D-2487- 00, consistency of cohesive materials or apparent density of non-cohesive materials, moisture content assessment, color, other descriptive features such as bedding characteristics, organic materials, macrostructure of fine-grained soils, and depositional type. Rock lithology will be classified in the field by visually inspecting core samples and drill cuttings and documenting key characteristics such as rock type, color, grain size, texture, mineral composition, and structural features like bedding or fractures as well as Rock Quality Designation (RQD) to evaluate core integrity.

Depth information will be from direct measurements accurate to ±0.1 ft. Stratigraphic/lithologic changes will be identified by a solid horizontal line at the appropriate scale depth on the log that corresponds to changes at the measured borehole depth. Gradational changes identified from cuttings will be identified by a horizontal dashed line at the appropriate scale depth based on the best judgment of the logger. Lines will be drawn with a straight edge. Boring logs will clearly show the depth interval from which all samples are obtained.

Logs will also indicate the presence or absence of water in boreholes, the depth at which water is first encountered, the depth to water at the completion of drilling, the stabilized water depth, and the time allowed for the levels to stabilize.

Boring logs will show drilling detail, including borehole and sample diameters, the depth at which changes occur in drilling or sampling methods or equipment, and the total depth of penetration and sampling. The bottom of the borehole will be identified by “Bottom of Borehole” clearly on the log. Any drilling or sampling problems will be noted on the logs, including descriptions of resolutions. Logs will include other information relevant to the investigation, including odors, field screening and test results (e.g., PID readings), and any evidence of contamination of samples, cuttings, or drilling fluids. Boring logs will be submitted in the RI Report.

3.6 Borehole Geophysical Survey

AECOM and its subcontractors will provide borehole geophysical services for the project. The downhole survey will assist AECOM in the identification of hydrogeologic properties of the groundwater system surrounding the landfill to evaluate potential remedies to mitigate the contaminants of concern migrating from the waste mass to the surrounding environment. Provided below is a review of the selected geophysical tools, implementation methods and planned outcomes.

Geophysical logging is a way to obtain continuous or semi-continuous, calibrated records of physical property measurements for in-situ materials. A suite of tools providing eight downhole profiles or discrete measurements is proposed for collection at each new borehole. Occasionally, this suite may vary based on in-field conditions, borehole stability, and/or borehole objectives. The following geophysical logs or tools will be used to characterize hydrogeologic conditions of each borehole: fluid temperature, fluid conductivity, single-point resistivity, spontaneous potential, mechanical caliper, natural gamma, heat pulse flow meter, acoustic tele-viewer (ATV) and optical tele-viewer (OTV). These tools will be implemented in existing wells (MW-1 through MW-11) where practical and in the open boreholes on the seven proposed boreholes (SB-04 through SB-10) before the groundwater monitoring wells are fully constructed. The drilling subcontractor will leave the open borehole without the polyvinyl chloride (PVC) piping installed for the geophysical subcontractor to deploy the borehole logging tools. As explained below, some geophysical tools, such as natural gamma, can be used on existing PVC or steel cased wells.

The downhole geophysical logging results will be incorporated into multiple components of the hydrogeologic characterization and will directly inform the development of the CSM. For analysis, presentation, and deliverables, geophysical profiles will be aligned on a common depth axis for each borehole and displayed side-by-side. This composite view is intended to support the identification of stratigraphic markers, fracture zones, and hydrogeologic features; assist with monitoring well installation and screen placement; and guide the selection of intervals for further investigation if necessary.

3.6.1 Fluid Temperature and Conductivity

Fluid temperature and fluid conductivity measurements are useful in determining changes in groundwater flow, geothermal gradients, salinity, groundwater quality, and groundwater presence (e.g., water table). If vertical flow is present within the borehole, changes in temperature may provide useful information about the location of submerged fractures or shear zones. These tools will be run before the others, prior to disturbing the water column in the well. The fluid temperature and conductivity probe can be used in a fluid filled PVC or steel casing, or in an open borehole. Centralization of the probe in the borehole is not required.

3.6.2 Mechanical Caliper (3-Arm)

This probe utilizes three mechanically coupled arms to record a single continuous borehole diameter log. In the open-hole section of the borehole, this log is commonly used to aid in identifying irregularities in borehole diameter that may give insight into rock integrity, wash-out zones, and, of primary hydrogeologic importance – fractures, cavities, or voids. Within the cased portion of the borehole, caliper data elucidates the casing integrity and is useful for identifying potential casing wall or casing joint defects and casing length. Caliper data is collected in the upward direction starting at the bottom of the borehole. It can be collected in dry or fluid-filled cased (PVC or steel) or uncased boreholes. No centralization is required.

3.6.3 Natural Gamma

The natural gamma probe measures the emission of natural gamma radiation in media surrounding the borehole. This type of geophysical logging is commonly used to identify various geologic units in a borehole including lithology changes/boundaries. The gamma probe can be used in a fluid filled or dry, cased (PVC or steel casing), or in an open borehole. Centralization of the probe in the borehole is not required.

3.6.4 Single Point Resistance (SPR) and Spontaneous Potential (SP)

The SPR and SP logs are useful in determining lithology, water quality, and locations of fracture zones and data is typically collected concurrently. SPR and SP may also give insight into grain size and decreases with fracture density and dissolved-solids concentration in water. The SPR tool measures the resistance between a single downhole electrode and a surface electrode that has been grounded. A constant current is passed between the two electrodes, and the voltage variations are recorded as the tool is moved either up or down the borehole. The SP tool measures potentials or voltages developed between the borehole fluid and the surrounding rock and fluids. The SPR/SP probe must be used in a fluid filled open borehole. Centralization of the probe in the borehole is not required.

3.6.5 Acoustic Televiewer (ATV)

The acoustic televiewer provides high-resolution acoustic amplitude and travel time data, which can aid in characterizing features, including fractures, cavities, and solution enlarged joints. The acoustic televiewer probe consists of a high-frequency piezoelectric ceramic crystal and a rotating mirror. Through specifically designed synchronization, the crystal serves as both transducer and receiver of the acoustic signal. The acoustic signal travels from probe, through the borehole fluid, to the borehole wall, where some energy is transmitted into the formation, while some is reflected back to the crystal, providing a high-resolution image of the borehole wall. The acoustic elements and impedance are matched to the borehole fluid in

order to provide optimum reflected amplitude and high-resolution images. In addition, data are corrected to magnetic north by a series of magnetometers and accelerometers. The tool also simultaneously records azimuth, pitch, and roll data. These measurements provide corrections that aid in the determination of fracture orientation.

The acoustic televiewer log requires a fluid-filled borehole because the fluid transmits the acoustic signal. Generally, data can only be collected in open sections of the borehole; the probe may be lowered through PVC or metal casing to reach the open borehole. Centralization of the probe is paramount for high quality data collection, due to the 360° data stream around the probe.

3.6.6 Heat Pulse Flowmeter (HPFM)

The HPFM is used to measure low flow rates in the borehole and assess the vertical direction of fluid flow within the open borehole. The tool must be used in a water-filled open borehole. Centralization of the probe in the borehole is not required. The subcontractor will complete the flow meter survey under static conditions.

3.6.7 Optical Televiewer (OTV)

An OTV is a high-resolution borehole logging tool used to capture continuous, oriented, 360-degree images of the borehole wall. It provides true-color visuals that allow for the identification and orientation of geological features such as fractures, bedding, and foliation. The OTV is deployed in water-filled, uncased boreholes and is typically used alongside other geophysical methods to enhance structural interpretation. Data collected are processed to generate unwrapped borehole images and stereonets.

Borehole geophysical logging will be timed to execute as the borehole reaches the desired depth and AECOM is practically assured the borehole is stable, without bridging or collapsing.

AECOM will schedule the geophysical logging as close to completion of development as is possible during a normal work week. The subcontractor will decontaminate each logging tool between locations utilizing either a pressure washer or non-phosphatic detergent wash with potable water rinse. Temporary containerization and onsite staging of decontamination fluids generated during geophysical logging will be disposed in accordance with Section 9. Decontamination and Management of Investigation Derived Waste.

The contractor will provide AECOM with a field summary report including composite graphs, ATV log analysis, and heat pulse flowmeter results from each borehole following demobilization after each logging event. For presentation and analysis purposes, the downhole profiles will be situated on a common depth-axis for a given borehole with profiles presented adjacent to each other for interpretation. This composite view of the borehole aids in the identification of stratigraphic markers and the selection of features warranting further investigation (e.g., hydraulic conductivity testing). Results will be used to update the CSM and guide subsequent remedial alternatives analysis for the feasibility study.

3.7 Groundwater Investigation

Groundwater investigation field activities will include the following:

- Monitoring Well Installation;
- Existing and New Monitoring Well Development;
- Groundwater Elevation Survey;
- Groundwater Sampling from Monitoring Wells; and,
- Aquifer Testing

3.7.1 Monitoring Well Installation

Seven (7) soil borings (SB-04 to SB-10), to be subsequently converted to monitoring wells (MW-4D, MW-5D, MW-12S, MW-13S, MW-14S, MW-15D, and MW-16D), will be advanced to the bedrock surface using 6 1/4-inch HSA while continuously collecting soil samples using a split-spoon sampler. One (1) soil sample from the overburden will be collected for laboratory analysis, as able and based on the lack of significant overburden material, as described in Section 2.5.3 of this RIFS WP.

Upon reaching the bedrock surface, the augers will be removed, and a temporary 6-inch diameter casing will be installed. A 5 7/8-inch ID rotary bit will then be used to drill 3 to 5-foot long rock sockets. The supervising geologist will note and record observations of drill cuttings. A 4-inch diameter permanent steel casing will then be set into the rock socket and grouted with a cement/bentonite grout. The grout will be allowed to cure for at least 24 hours. After the grout has cured, the boring will be continuously cored to the target depth of approximately 50 feet below bedrock surface bgs for the shallowest bedrock monitoring well and approximately 100 feet into bedrock for the deeper bedrock monitoring well using an HQ core barrel. For the deeper bedrock monitoring wells, upon encountering the shallow aquifer, it will be isolated by installing a bentonite grout mix seal, to prevent hydraulic communication with deeper zones.

The seven (7) bedrock monitoring wells will be constructed with a 10-foot, 2-inch ID #10 slot PVC continuous wrap screen attached to a 2-inch ID, Schedule 40 PVC riser to the ground surface. All bedrock wells will be completed with stick-up well casings.

3.7.2 Well Development

Prior to groundwater sampling for this RI, any dedicated tubing or equipment in the eleven existing Site wells (MW-1, MW-3 to MW-11, inclusive of MW-6A and MW-6B [MW-2 is no longer present]) will be removed. Existing and new monitoring wells will be redeveloped as part of this RI. Re-development removes accumulated sediments and fines and improves hydraulic connection between the formation and the well screen. The following protocols will be followed for development:

- An submersible pump or a positive displacement pump (e.g., Waterra) will be used for well development. Pump selection will depend upon anticipated drawdown, volume of water required to be removed, and access to well or electric power supply. Approved and/or PFAS free equipment will be used for well development.
- During development, the field staff will record development information on the well development form. Periodic readings (every 0.5 to 1 well volume) will include depth to water, pumping rate, temperature, pH, conductivity, and turbidity.

The well development goals will be to:

- remove at least five casing volumes of water,
- achieve stabilized water quality parameters (i.e., temperature, pH, conductivity), and
- achieve a turbidity reading of 50 nephelometric units (NTU) or less.

If development goals have not been achieved after two hours of development, the field staff will contact the AECOM Project Manager for further instructions.

3.7.3 Groundwater Elevation Survey

In order to better understand the hydrogeologic conditions, one or more rounds of synoptic water level readings will be collected. A groundwater elevation survey will be taken prior to sampling new and existing wells.

Each well will be gauged using an electronic oil-water interface probe to determine the depth to water and the possible presence of any light non-aqueous phase liquids (LNAPL). Historically no LNAPL has been identified in on-site wells. Groundwater levels will be recorded on an appropriate log to the nearest 0.01 ft. The oil-water interface probe will be field decontaminated between monitoring well locations.

Field data will be converted into elevations using available survey reference data. These elevations will be used to prepare a groundwater contour map for each synoptic event which will be included in the RI Report.

3.7.4 Groundwater Sampling

Following completion of the well development activities, the monitoring wells will be allowed to stabilize for at least 72 hours, prior to sampling. Groundwater samples will be collected using low-flow sampling techniques to the extent practicable. Groundwater samples will be analyzed for the TCL/CP-51 SVOCs, TAL metals, 1,4-dioxane and PFAS. In addition, select groundwater samples will be analyzed for TCL/CP-51 VOCs, pesticides, herbicides PCBs, and cyanide. Groundwater samples will also be analyzed for routine landfill parameters as specified in 6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters. It is noted that several of these parameters are incorporated in the previously listed analyte lists (i.e. TAL Metals).

If there is insufficient water in a well for low-flow sampling or the well goes dry during purging, a grab sample may be obtained after the well recharges. Table 3 provides summary information for the groundwater samples to be collected including the laboratory analyses to be completed. Additional information regarding analytical parameters is discussed in the QAPP.

Groundwater sampling equipment will be free of PFAS materials. Sampling methods will be in accordance with the NYSDEC guidance documents listed in prior sections of this RIFS WP.

3.7.4.1 Low Flow Sampling Technique

Groundwater sampling will be completed in accordance with Groundwater Sampling Guidelines for Superfund and RCRA Project Managers (USEPA OSWER 542-S-02-001). The default groundwater sampling method will be in accordance with EPA's low stress (often referred to as low flow) sampling technique (EPA, 1998).

A bladder pump (or another suitable pump) will be used to purge and sample the well. The pump intake will be set at the midpoint of the screened interval, or as dictated by field conditions if there is minimal water in the well. The pump will be operated at a target flow rate of 300 to 500 milliliters per minute (mL/min). Field parameters from water quality instruments will be recorded on the well sampling form (see Appendix G) every five minutes during purging and will include:

- flow rate (mL/min);
- depth to water (0.01 ft);
- temperature (degrees Celsius);
- pH standard units (S.U.);
- specific conductance (millisiemens per centimeter [ms/cm]);
- dissolved oxygen (DO) (milligrams per liter [mg/L]);
- oxidation-reduction potential (ORP) (millivolts [mV]); and
- turbidity (NTU).

A flow-through cell will be used to obtain temperature, pH, specific conductance, DO, and ORP. A turbidity meter will be used to measure turbidity. The water quality instruments will be checked daily prior to the start of sampling to ensure proper calibration is maintained. Purging will be considered complete when the indicator parameters have stabilized over three (3) consecutive readings. Stabilization parameters are:

- purge rate: between 300 and 500 mL/min;
- depth to water less than 0.3 ft drawdown during purging;
- pH ± 0.1;

- conductivity: ± 3%;
- DO: ± 10 % (mg/L);
- ORP: ±10 mV; and
- Turbidity: less than 50 NTU.

If stabilization is not achieved after two (2) hours of purging, or if the well goes dry due to insufficient recharge, a grab sample will be collected after the well has had time to recharge.

During sample collection, the flow-through cell will be disconnected and the sample tubing discharge will be directed into the laboratory supplied sample containers. The flow rate will be decreased to approximately 100 mL/min during sample collection for VOC analysis. Groundwater samples will be packaged in accordance with Section 7.6 of this RIFS WP and submitted to the laboratory for analysis.

3.7.5 Aquifer Property Testing - Slug Tests

Aquifer tests will be performed to determine various hydrogeologic parameters (aquifer characteristics) such as permeability, transmissivity, and storativity. The method that will be used will be short-term permeability tests (often referred to as “slug” tests). Slug tests are proposed to be conducted at five locations, at three shallow wells (MW-4, MW-13S, MW-14S) and two deep (MW-4D and MW-5D).

For shallow wells under unconfined conditions, as are present at this Site, in-situ permeability tests will be conducted using both the “slug in” or falling head test method and the “slug out” or rising head test method for partially penetrating unconfined aquifers.

Slug tests will be performed in a similar manner as described in ASTM D-4044 to determine the hydraulic characteristics of the groundwater aquifer(s) within the area of newly constructed wells. For shallow wells under unconfined conditions, it is anticipated that the permeability test data will be interpreted based on the Bouwer and Rice Method (Bouwer and Rice, 1976; Bouwer, 1989). The procedures to be followed during the slug testing are described below.

3.7.5.1 Slug In Method:

A stainless steel or PVC slug will be lowered into the water column to raise the water level in the well. The recovery of the water table will be measured using a water level meter or a pressure transducer. The water level will be permitted to recover to at least 90 percent of the original static water level. Following recovery, a “Slug Out” test will be completed.

3.7.5.2 Slug Out Method:

The slug will then be quickly removed from the water column. The recovery of the water table will be measured using a water level meter or a pressure transducer. The water level will be permitted to recover to at least 90 percent of the original static water level. The equipment (slug, water level meter, transducer) used in the test will be decontaminated prior to use at the next well. A new length of nylon cord will be used at each well to suspend the slug.

If used, the electronic transducer will be set to collect water levels at appropriate logarithmic intervals to provide adequate data to determine the hydraulic conductivity of the monitoring well. Data collected by the data logger will be checked in the field immediately following each test. If the data is not adequate (incorrect timing, transducer cable moved or disturbed, etc.) from the judgement of the field geologist, then the test will be re-run so that adequate data may be collected.

Should there be insufficient water in the well to run the slug in and/or slug out test method, the project manager shall be contacted and alternative testing methods discussed.

3.7.6 Monitoring Well Decommissioning and Borehole Abandonment

It is not currently anticipated that monitoring well decommissioning will be required. If a monitoring well or boring requires abandonment, decommissioning will be performed in accordance with NYSDEC Policy CP-43 (NYSDEC, 2009). Several methods are available such as grouting in place, casing perforation/grouting in place, or over-drilling followed by grouting. The best method is dependent on the type of well and construction details.

Soil borings, if not subsequently converted to monitoring wells, will be backfilled with a combination of soil cuttings that are not visibly contaminated (i.e. olfactory signs, elevated PID, staining, and/or visible product) and hydrated bentonite chips. All soil cuttings generated by soil boring or well abandonment activities will be containerized pending final disposition as detailed in subsequent sections of this RIFS WP.

3.8 Surface Water and Sediment Sampling

Surface water and sediment samples will be collected throughout the riverine and pond areas (upstream and downstream) located on and off-site. Sediment samples will be collocated with surface water samples. Areas to be sampled include locations sampled during site characterization (SW/SD-1, SW/SD-3 to SW/SD-5 and BRS-SW/SD), discharge points of the catch basins in the riverine (SW/SED-6 and SW/SED-7), and at a downstream location in the pond area near the property boundary (SW/SED-8). It is noted that historic samples SW/SD-02 were not collected during the site characterization as no water was present at that location during sampling. No water was observed at this location during AECOM's site visit. The location of former sample SW/SD-02 will be inspected for water during sampling activities, a surface water/sediment sample will be collected if water is present and will be labeled as SW/SED-2 for sample labeling consistency.

Additional sediment samples might be collected in areas where leachate seeps are identified at/near the stream bank or shoreline. At least one (1) surface water and sediment sample will be collected during critical, low-flow conditions. The collection of additional surface water and sediment (surficial and deeper) samples might be warranted in the future upon the completion of the Fish and Wildlife Resources Impact Analysis. Sampling locations are shown in Figure 9.

Samples will be analyzed, TCL/CP-51 SVOCs, TAL metals, 1,4-dioxane and PFAS. In addition, select samples will be analyzed for TCL/CP-51 VOCs, pesticides, herbicides PCBs, and cyanide. Sediment samples will be analyzed for total organic carbon (TOC). Surface water samples will also be analyzed for routine landfill parameters as specified in 6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters. It is noted that several of these parameters are incorporated in the previously listed analyte lists (i.e. TAL Metals). Table 3 summarizes the samples to be collected and laboratory analyses. Additional information regarding the laboratory analyses is presented in the QAPP.

3.8.1 General Considerations

Surface water and sediment samples will be collected by field personnel in waders. Due to the shallow nature of the riverine and pond, the use of a boat is not anticipated. Surface water and sediment sampling will begin from the most downstream location and proceed to the most upstream location. At any given location, the surface water sample will be collected prior to the sediment sample to avoid increased turbidity from displaced sediment.

3.8.2 Sediment Sampling

Eight (8) surficial sediment samples (SED-01, SED-03 to SED-08, and BRS-SED), typically the top 4 inches (10 cm), will be collected to assess conditions in the biologically active zone. To the extent

possible, sampling area will be located in undisturbed depositional areas. Stream banks or shoreline will not be sampled unless a leachate seep is identified. Areas of high organic material such as twigs, leaves, and algae will be avoided.

The following method will be used to collect sediment samples.

- Stand facing the direction of flow and approach the sampling location from the downstream direction. Do not disturb the sediment prior to collecting the sample.
- Using dedicated equipment or a decontaminated stainless device (scoop, trowel, “scoopula,” or similar), scoop the sample in the upstream direction of flow. The depth of the sample should be within an inch of stream bottom. No more than two (2) inches deep.
- Decant as much water as possible from the scoop without losing any sediment. Remove any twigs, leaves or algae that is in the scoop.
- Homogenize sample, with minimal mixing to avoid volatilizing the sample. Transfer sample directly to an appropriate sample container avoiding scraping sides of the collection pan/bucket.
- Complete the label on the sample container and transfer the sample container(s) to an iced cooler.
- Record sample and water body information, and any significant observations such as staining, oily sheen, or odors. A sediment sample collection form (Attachment D) will be completed with the relevant information (depth of sample, sediment color and description, depth of water, physical characteristics of the water body, etc.)
- Place a stake (or similar) in the center of the sampling location as a visual indicator for subsequent surveying. Otherwise, measure the location from fixed (permanent) objects using a measuring device (if feasible).
- PFAS samples will be collected prior to other samples, and segregated from other samples in a separate cooler, to avoid contact with any other type of sample container, bottles or packaging material that may have PFAS-related content. All equipment will be decontaminated with water from a PFAS-free source.

3.8.3 Surface Water Sampling

Eight (8) surface water samples (SW-01, SW-03 to SW-08, and BRS-SW) will be collected utilizing hand sampling procedures for a shallow water body surface. A dip or grab sample is appropriate for a small body of water, or for collecting near-surface samples in a larger surface water body. Initiate sampling from downstream to upstream locations to avoid sampling surface water that has been disturbed. The surface water sample should be collected prior to the sediment sample to avoid increased turbidity from displaced sediment.

The following method will be used to collect surface water samples.

- Stand facing the direction of flow and approach the sampling location from the downstream direction.
- Submerge a dedicated container or a decontaminated stainless device either just below the surface or lower the container to a desired depth by using a weighted holder.
- For shallow bodies of surface water, hold the sample container carefully just beneath the water surface to avoid disturbing the streambed and stirring the sediment. Position the container's mouth so that it faces upstream, while the sampling personnel are standing downstream.
- Any preservative added to the sample should be added after sample collection to avoid loss of preservative. Alternatively, a transfer device or pump (i.e., peristaltic) may be dipped into the

water and used to transfer the sample volume to the appropriate container containing the preservative.

- For near-surface sample collection in a large surface water body, a pond sampler may be used if an extended reach is required to collect a representative sample. A pond sampler consists of a stainless steel or single-use High-Density Polyethylene (HDPE) sample container attached to a telescoping, heavy-duty, pole via an adjustable clamp attached to the end.

- Complete the label on the sample container and transfer the sample container(s) to an iced cooler.

- Record sample and water body information, and any significant observations such as staining, oily sheen, or odors. A sediment sample collection form (Attachment D) will be completed with the relevant information of the surface water sample (depth of sample, depth of water, physical characteristics of the water body, etc.)

- Place a stake (or similar) in the center of the sampling location as a visual indicator for subsequent surveying. Otherwise, measure the location from fixed (permanent) objects using a measuring device (if feasible).

- PFAS samples will be collected prior to other samples, and segregated from other samples in a separate cooler, to avoid contact with any other type of sample container, bottles or packaging material that may have PFAS-related content. All equipment will be decontaminated with water from a PFAS-free source.

3.9 Leachate Sampling

A leachate sample (L-1) will be collected from the southernmost 2,000-gallon leachate holding tank, east of the landfill access road to assess the leachate composition. One leachate sample from this holding tank will be considered representative of leachate from the remaining active holding tanks. A second leachate sample (L-2) will be collected from one of the 1,000-gallon leachate holding tanks (if accessible). One leachate sample from this holding tank will be considered representative of leachate from the separate surface seep collection system. Alternatively, if the 1,000-gallon tanks are not accessible, leachate sample L-2 will be collected directly from the 10,000-gallon storage tank.

The leachate sample(s) will be analyzed for TCL/CP-51 SVOCs, TAL metals, 1,4-dioxane, PFAS, TCL/CP-51 VOCs, pesticides, herbicides PCBs, and cyanide. The leachate sample will also be analyzed for routine landfill parameters as specified in 6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters. It is noted that several of these parameters are incorporated in the previously listed analyte lists (i.e. TAL Metals). Table 3 summarizes the samples to be collected and laboratory analyses. Additional information regarding the laboratory analyses is presented in the QAPP.

The following method will be used to collect leachate samples.

- Liquid height in the tank will be assessed prior to sampling to determine the height of sampling column. Depending on the height of the sampling column, one sample will be collected (if low volume is identified) or multiple samples will be collected from several points within the liquid column and composited (if a significant volume is present).

- A tank sampler will be used to extend reach within the holding tank to collect a representative sample. A tank sampler consists of a stainless steel or single-use HDPE sample container attached to a telescoping, heavy-duty, pole via an adjustable clamp attached to the end. Alternatively, a transfer device or pump (i.e., peristaltic) may be dipped into the tank and used to transfer the sample volume.

- Any preservative added to the sample should be added after sample collection to avoid loss of preservative. Alternatively, a transfer device or pump (i.e., peristaltic) may be dipped into the tank and used to transfer the sample volume to the appropriate container containing the preservative.
- Complete the label on the sample container and transfer the sample container(s) to an iced cooler.
- Record sample information, and any significant observations such as staining, oily sheen, or odors.
- PFAS samples will be collected prior to other samples, and segregated from other samples in a separate cooler, to avoid contact with any other type of sample container, bottles or packaging material that may have PFAS-related content. All equipment will be decontaminated with water from a PFAS-free source.

4. Soil Vapor Intrusion

According to the 2023 C&A SCI Report, soil gas surveys revealed that where soil or cut-and-fill material overlies the landfill refuse, total organic volatile (TOV) concentrations are fairly high. Lateral migration of TOVs from these areas through the vadose zone, however, is minimal. As discussed in section 3.1.1, there is suspected vapor intrusion into the unoccupied former Highway Department office building. While additional soil gas samples are not proposed as part of this RIFS WP, potential soil vapor intrusion (SVI) exposure pathways will be assessed under the Qualitative Human Health Exposure Assessment utilizing the available data. Data collected from this, and prior investigations will be used for potential future SVI sampling at this site, following completion of this RIWP.

5. Decontamination and Management of Investigation Derived Waste

5.1 Equipment Decontamination

To avoid cross-contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures specified in this section. Field equipment rinsate blanks are generated and analyzed to monitor the effectiveness of field decontamination procedures.

Cross-contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

5.1.1 Decontamination Procedures

A temporary decontamination pad for subsurface drilling tools will be constructed on the Site. Additionally, the pad will be used for small equipment decontamination as well as personnel decontamination. The pad will be constructed near the Site entrance (or at another location TBD) to decontaminate vehicles (i.e., Geoprobe) and drilling tools entering and leaving the Site. The pad will be sized to be large enough to handle the equipment used on-site (e.g., drill rig) and to allow storage of cleaned equipment and materials prior to use. Drums of decontamination fluids and investigation derived wastes will be stored on pallets covered with plastic sheeting in the decontamination area.

5.1.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as sample tools, etc. will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse; and
- PFAS -free water rinse.

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a PFAS approved laboratory grade detergent (e.g., Alconox) and PFAS-free polyethylene or PVC plastic brush to remove visible contamination, followed by PFAS-free water rinses. Tap water may be used from any treated municipal water system if it can be certified PFAS-free; the use of an untreated potable water supply is not an acceptable substitute. PFAS –free water may need to be trucked on-site by the driller or provided by the laboratory.

Equipment should be allowed to dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Submersible sample pumps (bladder pumps) will be fitted with single-use PFAS-free sleeves per well. The pump housing, pump head and fittings will be decontaminated using the above steps followed by running a large volume (several gallons) of PFAS-free water through the pump, followed by a PFAS-free water rinse. PFAS-free bladder sleeves and tubing will not be re-used (new tubing will be used for each well or surface water sample location). Submersible pumps and supporting lines and cables will be placed in a plastic bucket filled with Liquinox and PFAS-free water and then run for several minutes (to decontaminate both exterior and interior parts). The process will be repeated with PFAS-free water.

Reusable sampling equipment (e.g., soil sampler, submersible pump, water level tape, etc.) will also be given a final PFAS-free water rinse of both interior and exterior parts.

5.1.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use, between boreholes, and prior to demobilization using a hot water pressure washer. A PFAS-free water source will be used and prior to use, ensure all equipment used for decontamination (i.e. pressure washers) do not contain parts that may be sources of PFAS cross-contamination. Decontamination, including larger equipment such as drill rigs, etc., will be conducted at a dedicated decontamination pad constructed for the project. Decontamination fluids will be containerized (drummed) pending final disposition.

5.1.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or as indicated in the HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures are provided in the HASP.

5.2 Management of Investigation Derived Waste

IDW management will be in accordance with Section 3.3(e) of DER-10 (NYSDEC, 2010). The sampling methods and equipment will be selected to limit both the need for decontamination and the volume of IDW. Personal protective equipment and disposable sampling equipment will be drummed for disposal as solid waste. Types of IDW typically generated include soil cuttings from soil borings installation; development and purge water from the wells and decontamination water from the drill rigs, DPT rigs, and equipment.

Well development, purge water from sampling, and decontamination water will be containerized and handled in accordance with the provisions of DER-10. Wastewater containing non-aqueous phase liquids, sheens, olfactory or visible evidence of contamination will be characterized for proper disposal based on hazardous or non-hazardous designation.

Soil boring holes may be backfilled with soil cuttings that are not visibly contaminated (i.e. olfactory signs, elevated PID, staining, and/or visible product). Visibly contaminated soils and water will be containerized in either new or reconditioned drums and stored within the designated IDW staging area. Drummed material will be characterized and disposed of in accordance with all applicable state and federal regulations. No mixing of clean soil with waste streams will be used to achieve non-impacted status.

5.2.1 Transportation and Disposal

All IDW not managed on Site will be characterized and shipped for off-site disposal. AECOM will collect characterization samples to classify the IDW and solicit bids for disposal at appropriate licensed facilities. A Hazardous Waste Manifest that documents shipping information, including transporter and disposal facility names and locations, will accompany all hazardous waste shipments. An AECOM-approved waste contractor will coordinate all waste disposal, transportation, treatment, and disposal.

6. Community Air Monitoring

A Community Air Monitoring Plan (CAMP) is used to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities.

The protocols cited below are based on the NYSDOH Generic Community Air Monitoring Plan (May, 2010; Appendix 1A to DER-10 [NYSDEC, 2010]) which is typically utilized by NYSDEC as guidance for work the activities. The Generic Community Air Monitoring Plan is presented in Appendix F.

6.1 Monitoring

Real-time air monitoring for VOCs, vapors and/or particulate levels at the perimeter and surrounding community of the work area will be conducted. Monitoring activities will consist of a combination of continuous and periodic monitoring, which will be performed dependent upon the type of activity being conducted at the Site, as discussed below.

The specific types of monitoring necessary and appropriate for any particular project are determined by NYSDEC and AECOM and specified in this RIFS WP.

6.1.1 Continuous Air Monitoring

Continuous monitoring for VOCs and particulates will be performed for ground intrusive activities associated with the Site, including, but not limited to, the installation of soil borings and groundwater monitoring wells.

VOC monitoring will be conducted at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. VOC monitoring will be performed using a MiniRAE 3000 or equivalent, which is appropriate to detect a wide range of contaminants typically encountered. The MiniRAE 3000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 3000 is capable of calculating 15-minute running average concentrations, which will be compared to the action levels specified below.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) such as a DustTrak 8530 or equivalent. The DustTrak 8530 is a real-time monitoring equipment capable of measuring particulate matter less than 10 microns (µm) in size [PM-10] and capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. In addition to using the particulate monitors, fugitive dust migration will be visually assessed during work activities. If particulate concentrations at the upwind station are higher or equivalent to concentrations at or downwind of work areas, then continuous air monitoring may be discontinued, as approved by NYSDEC.

The particulate and VOC monitors can be equipped with an audible alarm or integrated with a cellular modem as part of a monitoring station that is capable of sending text messages to Site personnel's cell phone to indicate exceedance of the action level.

Upwind and downwind stations will not be used during sediment/sludge sampling activities as the materials will be saturated and therefore particulate dust will be non-existent. The recovered materials will be continuously scanned with a PID and the number of cores open at any one time will be controlled to

minimize potential vapors. The work zone perimeter will be monitored periodically with the PID to confirm vapors are not leaving the work area.

6.1.2 Periodic (As-Needed) Air Monitoring

Periodic or as-needed air monitoring for VOCs will also be performed during intrusive and non-intrusive activities associated with this RIFS WP. Intrusive activities include soil borings and monitoring well drilling. Non-intrusive activities may include the collection of soil and sediment samples, the collection of groundwater samples from existing monitoring wells, and the collection of surface water and sediment samples. Periodic air monitoring during sample collection will consist of taking a reading upon arrival at a work or sample location, monitoring at the work area during drilling and sampling activities and taking a reading prior to leaving a sample location. VOCs will be measured using a PID.

6.2 Action Levels and Response

This subsection identifies the action levels and corresponding responses for concentrations of VOCs and particulates detected during the field activities associated with a site.

6.2.1 Volatile Organic Compounds

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 ppm above background for the 15-minute average, work activities will be temporarily halted and monitoring will continue. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be stopped, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 ft downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 ft), is below 5 ppm over background for the 15-minute average. If the organic vapor level is above 25 ppm at the perimeter of the work area, field activities will be shut down.

All 15-minute readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings (if any) used for decision purposes will also be recorded. In the event readings at the perimeter monitoring locations exceed 25 ppm above background for organic vapor levels, the NYSDEC and NYSDOH Project Managers will be notified of the exceedance. Included in the notification to the NYSDEC will be a list of mitigation measures implemented to reduce sustained readings for organic vapor including but not limited to vapor suppression and ventilation techniques.

6.2.2 Particulates

If the downwind PM-10 particulate level is 100 µg/m3 greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, the downwind PM-10 particulate levels are greater than 150 µg/m3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

Similar to the VOC readings, particulate readings will be recorded and be available for state (NYSDEC and NYSDOH) and county health personnel to review. In the event readings at the perimeter monitoring locations exceed 150 ug/m3 above background for particulate levels as sustained readings, the NYSDEC and NYSDOH Project Managers will be notified of the exceedance. Included in the notification to the NYSDEC will be a list of mitigation measures implemented to reduce sustained readings for particulate levels including but not limited to dust suppression.

7. Field Records and Documentation

The objective of this subsection is to provide consistent procedures and formats by which field records will be kept and activities documented, and a methodology by which field records will be managed. Field records and documentation to be used during field activities include field notes and standard forms. Standard Forms may include chain-of-custody (COC) forms, Drilling Logs, Well Development Forms, Well Sampling Forms, Aquifer Testing Forms, Well Condition Forms, and IDW Log Sheets.

7.1 Field Notes

Field notes will be prepared and maintained throughout the course of the investigation. Due to PFAS sampling only loose paper and forms on metal clipboards will be used for field notes. Weatherproof field log books are a PFAS concern and will not be used. The field notes will be maintained as a permanent part of the project file.

Notes will be labeled on the first page in ink with the following designation: “Site Name, Project Type (e.g., RI), NYSDEC Site No. 356062, and AECOM Project Number”.

Entries will be recorded in ballpoint pen. If errors are made in any field log book, field record (form), COC form, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Standard Forms have been adopted to facilitate the collection of consistent data (Appendix G). This will preclude detailed documentation of, for example, lithologic descriptions in the field notes. A reference, however, to use of each specific form must be made in the field notes.

The date, project name, and project number will be entered left to right, respectively, along the top of the page. Entries should be dated, and time of entry recorded. At the beginning of each day, the first two entries will be “Personnel/Contractors on Site” and “Weather.” At the end of each day's entry or particular event, if appropriate, the person entering the field notes should draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity.

Entries in field log notes will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on Site, visitor’s names, association, and time of arrival/departure, etc., should also be recorded.

Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field log notes become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field log notes. Additionally field personnel will note time and material expenditures for later verification of contractor invoices (i.e. bags of bentonite, number of drums etc.). The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the fieldnotes. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field notes, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Log notes will be updated as field work progresses.

When the RI is complete, the notes will be submitted to the AECOM project manager for final cataloging and filing. The notes will be stored in the Project File.

7.2 Standard Forms

All non-bound field records (e.g., drilling logs, well construction forms, sampling records, COCs, aquifer testing forms, well development and sampling logs) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be uploaded as soon as practical to office servers. If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file. A hard copy of the data, and any graphical representation produced by logging software, will also be printed out and duplicated. Select examples of commonly used forms are provided in Appendix G.

7.3 Sample Identification

During this project, a unique sample identifier will designate each sample collected. The following system may be used to assign unique sample identification numbers; however, modifications should be made as needed to clearly and appropriate identify samples for each site or project. Each sample will be identified by an alphanumeric character identifier, as described below.

The following codes will be used for identifying other sample types:

CODE	Sample Type
MW	Monitoring well
SB	Soil boring
SS	Surface Soil
SW	Surface water
VCB	Vibracore boring
SED	Sediment
EB	Equipment (Rinsate) Blank
FD-MMDDYY-N	Field Duplicate
TB	Trip Blank
MS/MSD	Matrix Spike/ Matrix Spike Duplicate

Field blanks, duplicates, and trip blanks will be labeled for the day of collection. For MS/MSD samples, the MS/MSD will be added to the sample ID and included on the COC as a note.

An example of the sample numbering system is provided below.

Sample Identifier	Description
MW-1S	Shallow well MW-1S
SB-2 – 4-6	Soil sample from 4 to 6 ft interval from boring SB-2.
SB-2 – SS	Surface Soil Sample (0-2”) at SB-2.
FD-060322-1	First field duplicate taken on 6/3/22.

FB-W-050222	Field blank associated with water samples collected on 5/2/22
TB-050311-2	Second Trip blank associated with samples shipped 5/3/11.

7.4 Sample Labeling

A non-removable label will be affixed to each sample container. Labels will be marked with permanent marker pens. The following information will be contained on each label:

- Project name;
- Sample identifier;
- Company (AECOM);
- Sample date and time;
- Sampler's initials;
- Sample preservation; and
- Analysis required.

7.5 Sample Chain of Custody

At the time of the sampling, a field team member will record the sample information in the field log book, well sampling form or drilling log, and on a COC form. The sample information recorded in the log books will be at least as detailed as that recorded on labels, and should indicate the type of sample (e.g., groundwater, soil), sample preservation, and sampling location, in sufficient detail as to allow re-sampling at the same location. Errors on forms or logbook entries will be stricken with a single line and corrected, with the date and initials of the person making the correction.

After samples are collected, the field team member will immediately place the filled containers in coolers and iced to 4 degrees Celsius (°C). Samples will be preserved as required and specified in the QAPP. The field team will maintain custody of the samples until they are shipped to the laboratory. The entries on the COC form will correspond to the field log book, standard forms, and sample labels.

Original copies of COCs will be forwarded to the laboratory. A copy (or photo) of the COC and associated shipping air bills will be maintained by the Field Supervisor with all other documentation until provided to the project manager. Copies will be filed by the project manager or designated representative on a weekly basis (at a minimum) in the project file for permanent storage.

7.6 Sample Packaging and Shipping

Samples collected for laboratory analysis will be shipped by a commercial overnight delivery service to the laboratory on the day of collection (if possible; otherwise samples will be shipped on the day after collection), following proper identification, COC, preservation, and packaging procedures. Samples which require maintenance at 4° C (essentially all aqueous and non-aqueous samples submitted for chemical analysis) which are collected and shipped on a Friday must be delivered to, and accepted by, the laboratory on Saturday; note that it may be necessary to arrange this in advance.

Sample packaging and shipping procedures are summarized as follows:

A properly completed COC form will be placed in a Ziplock bag and taped inside the cooler to accompany each sample shipment. The sample identifiers will be listed on the COC form. When transferring the

possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. The field team leader will retain a copy or photo of the completed COC. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

Shipping containers will have any drains taped shut and be lined with a lab provided plastic bag or garbage bag for secondary containment. Samples will be properly packaged to avoid breakage, stored on ice at 4^{o} C for shipment and dispatched to the appropriate laboratory for analysis.

(In the event that samples must be held overnight prior to shipment, the temperature of the cooler and presence of sufficient ice will be checked and new ice added prior to shipment.) Once the shipping container is packed, signed custody seals will be affixed in two locations to the cooler and covered with clear plastic tape. The cooler will be taped shut with strapping tape in at least two locations.

Samples will be transported to the laboratory by a commercial overnight carrier (e.g., FedEx) unless other arrangements are made on a project-specific basis (e.g., laboratory courier sample pickup; or hand delivery of samples to the laboratory by AECOM personnel).

8. Exposure and Risk Assessment Activities

8.1 Human Health Exposure Assessment (HHEA)

As part of the Remedial Investigation, a qualitative HHEA will be conducted in accordance with Section 3.10 of NYSDEC's DER-10 Technical Guidance. This assessment will evaluate both current and potential future exposure scenarios for human receptors, including site workers, nearby residents, and recreational users. The evaluation will identify and characterize potential exposure pathways such as ingestion of contaminated groundwater or surface water, dermal contact with impacted soil or sediment, and inhalation of volatile organic compounds (VOCs) and soil vapor.

Environmental media to be assessed include soil, groundwater, surface water, and soil vapor, with particular attention to emerging contaminants such as 1,4-dioxane and PFAS. Analytical results will be compared to applicable screening levels from NYSDEC, NYSDOH, and EPA to determine the potential for adverse health effects. The assessment will also consider site access restrictions, land use, and sensitive populations in proximity to the site. Findings will be used to inform the Conceptual Site Model (CSM) and guide the development of remedial alternatives.

8.2 Fish and Wildlife Impact Analysis (FWIA)

In accordance with Appendix 3C of DER-10, a FWIA will be performed to evaluate potential ecological risks associated with site-related contamination (see Appendix H). This assessment will identify sensitive habitats and ecological receptors that may be exposed to contaminants through groundwater discharge, surface water runoff, or direct contact with impacted soil and sediment.

The FWIA will include a review of available ecological data, mapping of regulated wetlands and significant natural communities, and identification of potential receptors such as aquatic organisms, amphibians, birds, and small mammals. Contaminant concentrations in surface water and sediment will be compared to ecological screening benchmarks to assess the likelihood of adverse effects. The bioavailability and potential for bioaccumulation of contaminants will also be evaluated.

If site conditions meet the criteria outlined in DER-10 for requiring a full FWIA, additional ecological investigations may be proposed. Otherwise, the qualitative assessment will support the development of the CSM and contribute to the evaluation of remedial alternatives.

9. Feasibility Study

The FS Report will involve a detailed analysis and evaluation of various remedial options based on the results of the RI. The FS will summarize the chemical and geological characterization of the site, identify volumes or areas of media to which general response actions might be applied, including considerations for overall protectiveness to human health and the environment. This study will include a cost-benefit analysis and GSR considerations (per DER-31) to aid in the selection of the most suitable remedial action, which will include an environmental footprint analysis.

AECOM will prepare a letter summarizing the key findings of the RI, Conceptual Site Model, exposure pathways, general response actions, screening of potential technologies, and a preliminary list of remedial alternatives for review by the Town of Hurley. After the Town's review, AECOM will submit the correspondence to NYSDEC for review and discussion. A maximum of four remedial alternatives are anticipated to be included for the detailed analysis of alternatives including the No Action baseline, restoration to predisposal conditions, and two additional alternatives. A Draft FS report will then be prepared after the remedial alternatives have been agreed upon by the Town of Hurley and NYSDEC. A detailed analysis will be presented in narrative form and will provide a basis for the selection of the remedy. The FS Report will be submitted as standalone or combined with the RIR under a single cover and as preferred by the Town of Hurley.

The FS Report will include the following:

- Site description and history;
- Conceptual Site Model
- Summary of RI and exposure assessment;
- Remedial goals and remedial action objectives;
- General Response actions;
- Identification and screening of traditional and new/innovative technologies;
- Development and analysis of alternatives;
- Assemble technologies into alternatives;
- Evaluation of alternatives with respect to appropriate balancing and threshold criteria;
- Evaluation of the institutional/engineering controls for the recommended remedy;
- Cost estimate for alternatives;
- A detailed examination of the relationship between the cost of remedial alternatives, green/sustainable assessment, and the level of protection; and
- Recommended remedy, with a supporting discussion.

10. Green and Sustainable Remediation

Development of this work plan was completed with the goal of implementing sustainable practices where possible in accordance with the goals of the DER-31 Green Remediation Policy (January 2011 and November 2023 Memorandum) and with Commissioner Policy 49 (CP-49): Climate Change and DEC Action by evaluating climate-related risks and integrating resilience measures in accordance with the Climate Leadership and Community Protection Act (CLCPA) and the Community Risk and Resiliency Act (CRRA). A climate vulnerability assessment (CVA) will be implemented during RI and revisited during the remedial alternatives evaluation in the FS. The CVA template and a summary of green remediation best management practices by the Environmental Protection Agency (EPA) is included in **Appendix I**.

Pursuant to the NYSDEC DER-31 GSR initiative, GSR principles and techniques shall be implemented to the extent feasible in the site management of the remedy. The major GSR components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increase in recycling, and increasing reuse of materials which would otherwise be considered a waste; and
- Incorporating GSR principles and techniques to the extent feasible in the future development at this site. Any future on-site building shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

During implementation of this work plan, the following GSR efforts will be incorporated into field activities:

- Vehicle idling will be reduced wherever practicable.
- Ground penetrating radar will be used as a non-invasive method, in lieu of excavating, to clear for utilities as well as identify any potential previously unidentified underground structures.
- Existing bedrock wells with appropriate construction will be used for borehole geophysics, eliminating the need for additional drilling activities and their associated impacts on the environment during this phase of work.
- Field tasks will be combined and conducted concurrently whenever possible, minimizing vehicle use to and from the Site.
- IDW drums will be removed from the Site in a single event at the end of each field mobilization as applicable, rather than daily pickups.
- When applicable, visits to stores to purchase field supplies, etc., and trips to the laboratory to drop off sample coolers will be limited or combined to save energy, reduce emissions, reduce localized noise, vibration, and wear and tear on roads.

During the remedy selection stage or as requested by NYSDEC, AECOM is prepared to conduct an environmental footprint analysis using the SiteWise™ tool and/or the EPA's Spreadsheets for Environmental Footprint Analysis (SEFA). These tools produce metrics that help estimate the overall environmental footprint of each remedial alternative to aid in the remedy selection process. This analysis should consider all relevant data (such as energy consumption, materials used, labor, etc.) for each potential remedy evaluated. This evaluation should be integrated with other site-specific considerations,

such as implementation, efficacy, cost, and community implications, to formulate a sustainable approach for site cleanup.

11. Community Participation Activities

Citizen participation activities will be completed in accordance with DER-23 Citizen Participation Handbook for Remedial Programs (2010). A Site Contact List has been developed (provided to NYSDEC under separate cover) and a local document repository has been established.

A CPP for the Site has been developed and issued to NYSDEC on July 21, 2025 under separate cover.

Community outreach efforts will be initiated as directed by the NYSDEC, or if interest from the public suggests the need. The outreach efforts may consist of the issuance of Fact Sheets and Public Meetings. The community outreach activities will be crafted to be accessible and meet the needs of the community.

12. Project Schedule and Deliverables

12.1 Schedule

The initial RI activities described in this RIFS WP will begin following acceptance of the final draft RIFS WP by the NYSDEC and NYSDOH. Presently, RI activities are anticipated to be performed during October/November 2025. Analytical laboratory data are anticipated to be received by the end of December 2025, with submittal of an RI Report within approximately 90 days thereafter. Changes to the schedule may occur due to the NYSDEC review and approval process, unforeseen weather delays, etc. Daily field reports will distributed to NYSDEC and NYSDOH project managers during the implementation of the field program;

12.2 Remedial Investigation Report

Upon completion of the field activities, an RI Report will be prepared to document the findings of the investigations performed at the Site. The report will be consistent with the requirements presented in DER-10 [NYSDEC, 2010] and will include:

- An executive summary;
- A Site description and history;
- Summary information regarding previous investigations performed at the Site;
- Figure(s) depicting soil borings, monitoring wells, and key Site features;
- Figures depicting sample locations and NYS standards, criteria, guidance (SCG) non-compliance values from the soil and groundwater analytical data collected during Site work;
- A discussion of analytical results;
- Descriptions of all field activities performed;
- Photographs taken during field activities;
- Data summary tables of detected compounds with SCGs listed and non-compliance values highlighted;
- A summary of all field observations, field measurements, and laboratory analytical data summarized in tabular format;
- Figure depicting groundwater elevation contours;
- Plan view and cross-section figures presenting laboratory analytical data and field observations of surface and subsurface soil and groundwater impacts;
- Depth-aligned geophysical logging data profiles across boreholes to support hydrogeologic interpretation.
- Orthomosaic RGB and thermal imagery figures processed from the UAS/drone survey.
- An integration of field observations and measurements with laboratory analytical data to evaluate the nature and extent of impacts;
- A Data Usability Summary Report (DUSR) (including Form 1s) containing only data from the RI field activities;

- A Qualitative Human Health Risk Exposure Assessment (if necessary);
- A Fish and Wildlife Impact Analysis (FWIA) through Step IIB (if necessary);
- An updated conceptual site model;
- A set of conclusions for the investigation; and
- Recommendations.

This task includes EQuIS submittals to the NYSDEC database for all analytical data collected during the RI.

The RI Report will be reviewed and approved by a qualified environmental professional. The report and Site data will be prepared and organized such that it can be used for the evaluation of remedial alternatives for the Site, as necessary. If appropriate, recommendations for additional Site activities will be furnished.

13. References

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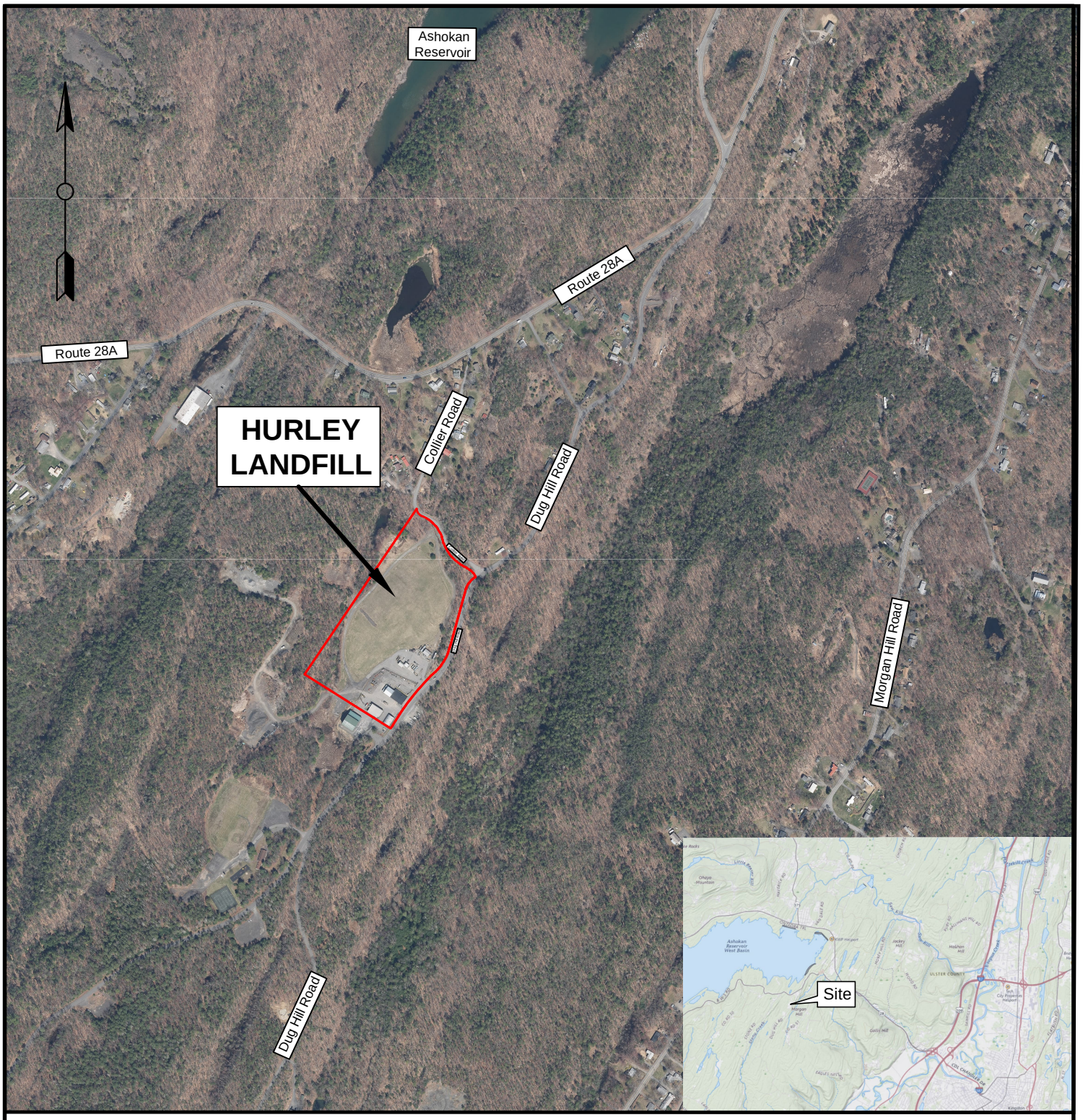
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FIGURES



BASEMAP RESOURCE FILES:

NYS GIS Clearinghouse Aerial Map 2021
USGS National Map

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APPROXIMATE SCALE IN FEET
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Issue Status: DRAFT

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TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 2025-08-11

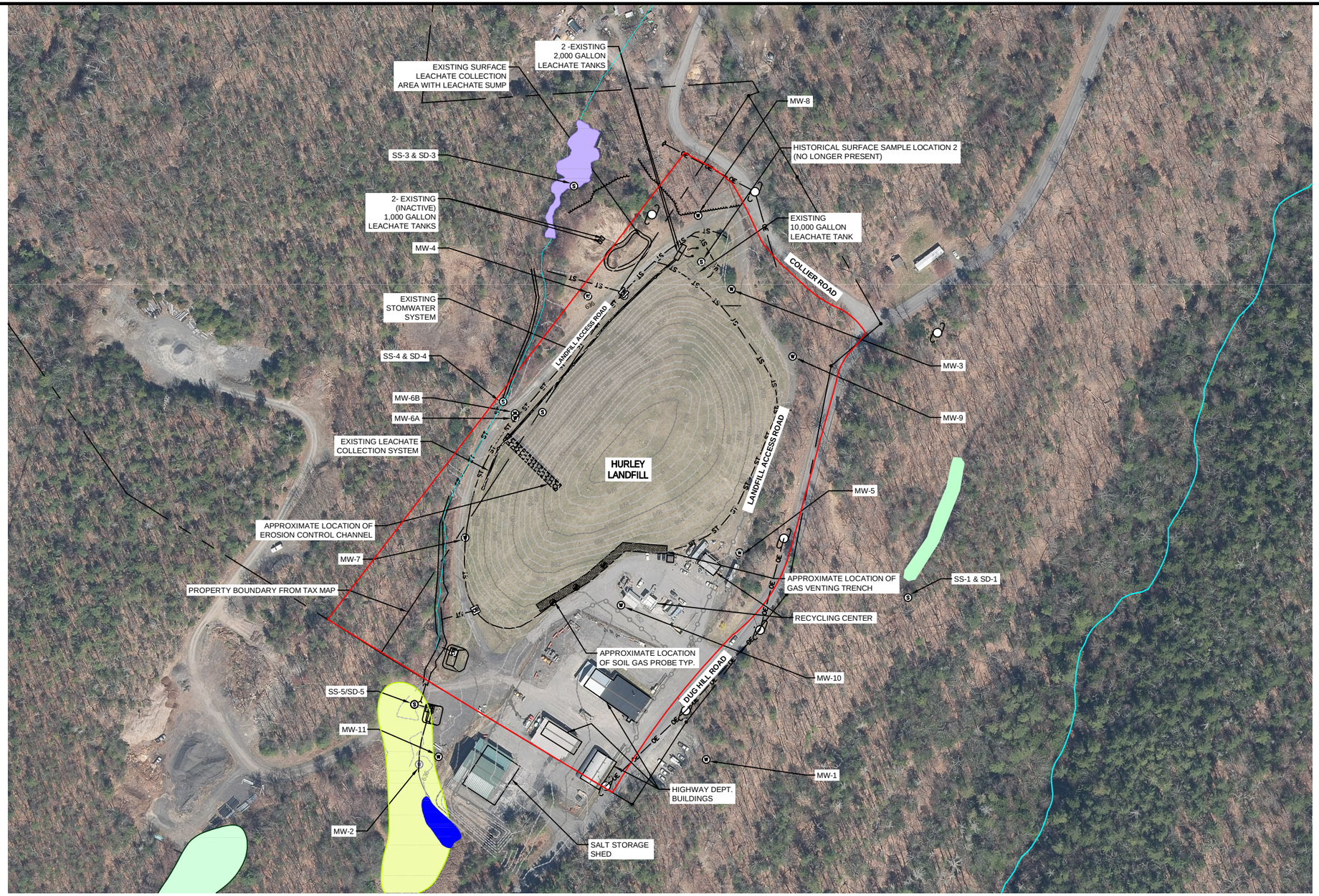
SITE LOCATION

AECOM

Figure: 1

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LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY
- STREAMS
- FRESHWATER EMERGENT WETLAND
- FRESHWATER FORESTED/SHRUB WETLAND
- FRESHWATER POND
- SURFACE WATER

OFFSITE SAMPLING LOCATION



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-21

SITE PLAN

AECOM

Figure: 2

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Project Management Initials: Designer: E.J.H. Checked: Approved: ANSI B 17" x 11"



BASEMAP RESOURCE FILES:
1. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS–ULSTER COUNTY PARCEL ACCESS.
2. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

0 400' 800'

1" = 100'

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-12-03

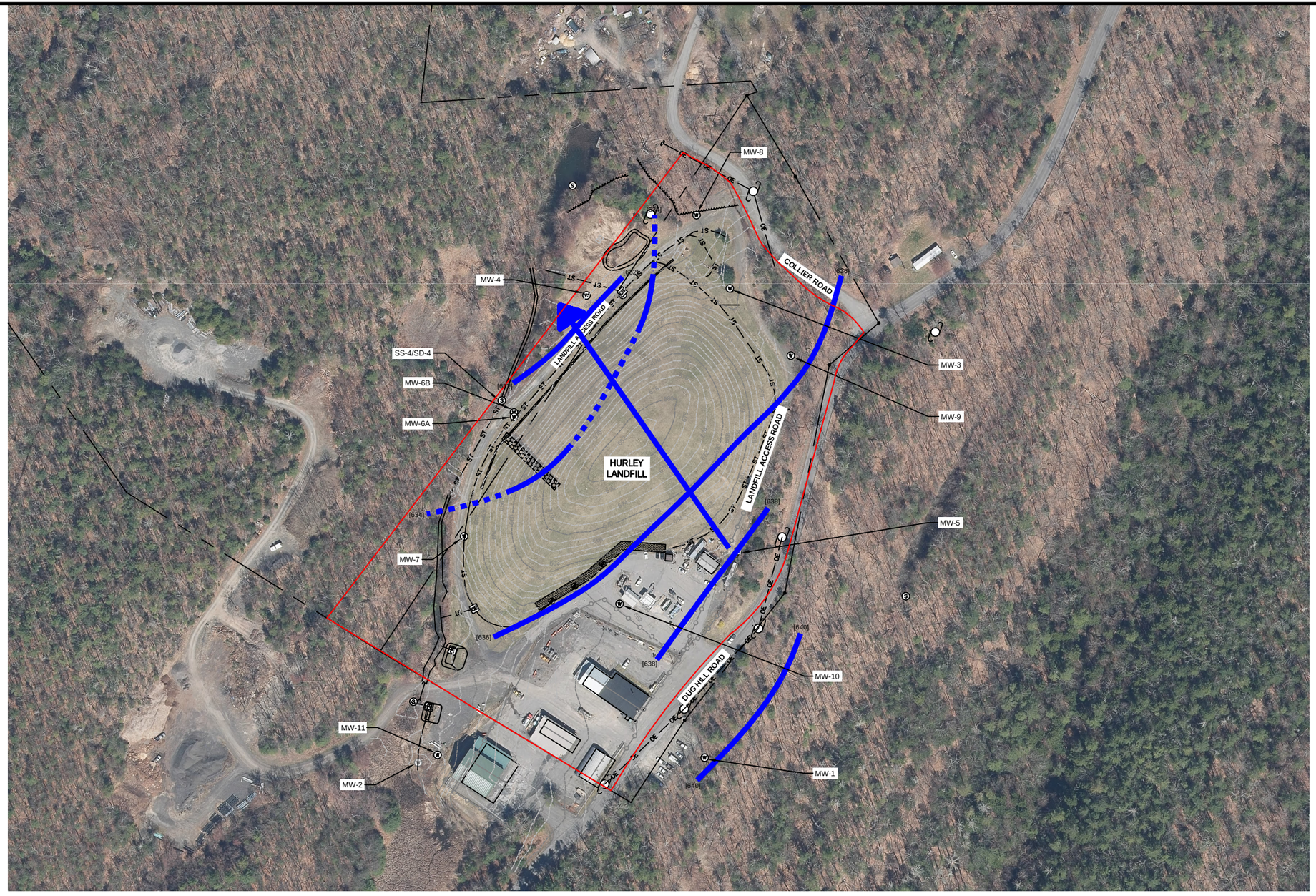
TAX PARCELS

AECOM

Figure: 3

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Project Management Initials: Designer: Checked: Approved: ANSI B 17" x 11"



LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL (1208)
- EXISTING CONTOUR MAJOR INTERVAL (1210)
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- EXISTING MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY
- GROUNDWATER FLOW DIRECTION
- [636] GROUNDWATER CONTOUR ELEVATION DATA

OFFSITE SAMPLING LOCATION



0 200' 400'

1" = 100'

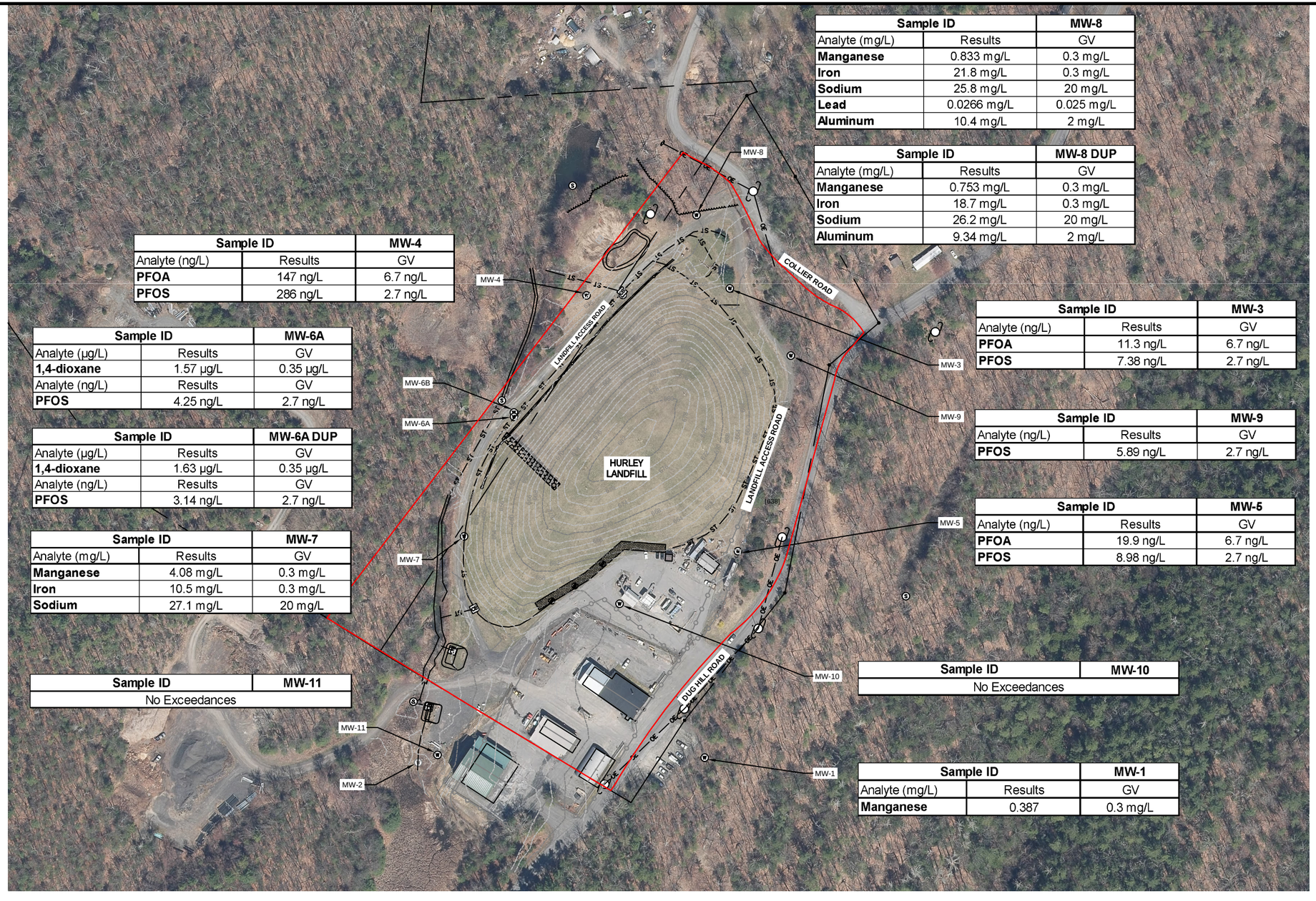
BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-21

GROUNDWATER CONTOURS (2022)

AECOM

Figure: 4



Sample ID	MW-8
Analyte (mg/L)	Results	GV
Manganese	0.833 mg/L	0.3 mg/L
Iron	21.8 mg/L	0.3 mg/L
Sodium	25.8 mg/L	20 mg/L
Lead	0.0266 mg/L	0.025 mg/L
Aluminum	10.4 mg/L	2 mg/L

Sample ID	MW-8 DUP
Analyte (mg/L)	Results	GV
Manganese	0.753 mg/L	0.3 mg/L
Iron	18.7 mg/L	0.3 mg/L
Sodium	26.2 mg/L	20 mg/L
Aluminum	9.34 mg/L	2 mg/L

Sample ID	MW-4
Analyte (ng/L)	Results	GV
PFOA	147 ng/L	6.7 ng/L
PFOS	286 ng/L	2.7 ng/L

Sample ID	MW-3
Analyte (ng/L)	Results	GV
PFOA	11.3 ng/L	6.7 ng/L
PFOS	7.38 ng/L	2.7 ng/L

Sample ID	MW-6A
Analyte (µg/L)	Results	GV
1,4-dioxane	1.57 µg/L	0.35 µg/L
Analyte (ng/L)	Results	GV
PFOS	4.25 ng/L	2.7 ng/L

Sample ID	MW-9
Analyte (ng/L)	Results	GV
PFOS	5.89 ng/L	2.7 ng/L

Sample ID	MW-6A DUP
Analyte (µg/L)	Results	GV
1,4-dioxane	1.63 µg/L	0.35 µg/L
Analyte (ng/L)	Results	GV
PFOS	3.14 ng/L	2.7 ng/L

Sample ID	MW-5
Analyte (ng/L)	Results	GV
PFOA	19.9 ng/L	6.7 ng/L
PFOS	8.98 ng/L	2.7 ng/L

Sample ID	MW-7
Analyte (mg/L)	Results	GV
Manganese	4.08 mg/L	0.3 mg/L
Iron	10.5 mg/L	0.3 mg/L
Sodium	27.1 mg/L	20 mg/L

Sample ID	MW-10
No Exceedances	

Sample ID	MW-11
No Exceedances	

Sample ID	MW-1
Analyte (mg/L)	Results	GV
Manganese	0.387	0.3 mg/L

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL (1208)
- EXISTING CONTOUR MAJOR INTERVAL (1210)
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- EXISTING MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY

OFFSITE SAMPLING LOCATION



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-21

GROUNDWATER EXCEEDANCES (2022)

AECOM

Figure: 5

Sample ID		SS-3
Analyte (µg/L)	Results	GV
1,4-dioxane	0.576 µg/L	0.35 µg/L
BIS (2-Ethylhexyl) Phthalate	11.4 µg/L*	5 µg/L
Analyte (ng/L)	Results	GV
PFOA	15.4 ng/L	6.7 ng/L
PFOS	40.3 ng/L	2.7 ng/L
Analyte (mg/L)	Results	GV
Aluminum	2.19 mg/L	2 mg/L
Iron	7.2 mg/L	0.3 mg/L
Manganese	1.01 mg/L	0.3 mg/L
Sodium	127 mg/L	20 mg/L
***Likely Laboratory Contamination**		

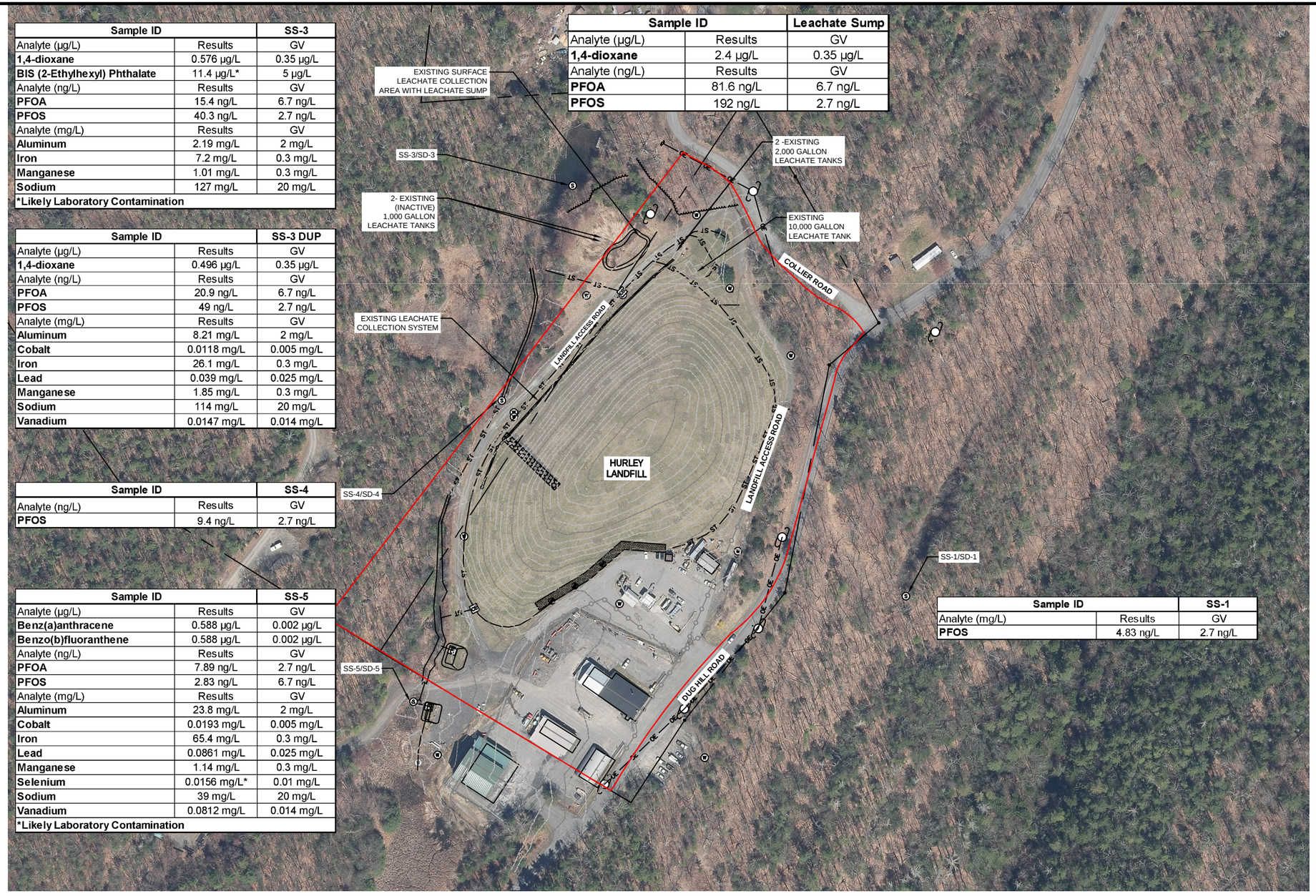
Sample ID		Leachate Sump
Analyte (µg/L)	Results	GV
1,4-dioxane	2.4 µg/L	0.35 µg/L
Analyte (ng/L)	Results	GV
PFOA	81.6 ng/L	6.7 ng/L
PFOS	192 ng/L	2.7 ng/L

Sample ID		SS-3 DUP
Analyte (µg/L)	Results	GV
1,4-dioxane	0.496 µg/L	0.35 µg/L
Analyte (ng/L)	Results	GV
PFOA	20.9 ng/L	6.7 ng/L
PFOS	49 ng/L	2.7 ng/L
Analyte (mg/L)	Results	GV
Aluminum	8.21 mg/L	2 mg/L
Cobalt	0.0118 mg/L	0.005 mg/L
Iron	26.1 mg/L	0.3 mg/L
Lead	0.039 mg/L	0.025 mg/L
Manganese	1.85 mg/L	0.3 mg/L
Sodium	114 mg/L	20 mg/L
Vanadium	0.0147 mg/L	0.014 mg/L

Sample ID		SS-4
Analyte (ng/L)	Results	GV
PFOS	9.4 ng/L	2.7 ng/L

Sample ID		SS-5
Analyte (µg/L)	Results	GV
Benz(a)anthracene	0.588 µg/L	0.002 µg/L
Benzo(b)fluoranthene	0.588 µg/L	0.002 µg/L
Analyte (ng/L)	Results	GV
PFOA	7.89 ng/L	2.7 ng/L
PFOS	2.83 ng/L	6.7 ng/L
Analyte (mg/L)	Results	GV
Aluminum	23.8 mg/L	2 mg/L
Cobalt	0.0193 mg/L	0.005 mg/L
Iron	65.4 mg/L	0.3 mg/L
Lead	0.0861 mg/L	0.025 mg/L
Manganese	1.14 mg/L	0.3 mg/L
Selenium	0.0156 mg/L*	0.01 mg/L
Sodium	39 mg/L	20 mg/L
Vanadium	0.0812 mg/L	0.014 mg/L
***Likely Laboratory Contamination**		

Sample ID		SS-1
Analyte (mg/L)	Results	GV
PFOS	4.83 ng/L	2.7 ng/L

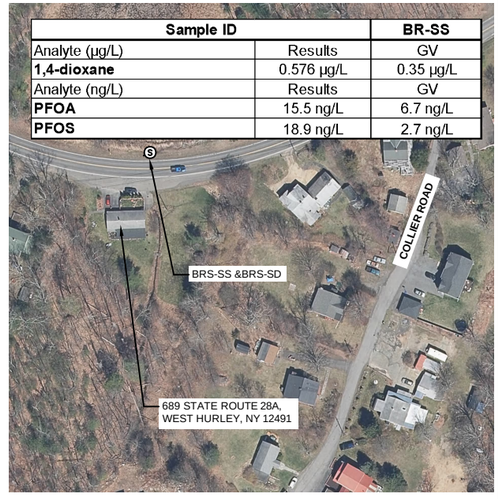


LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- EXISTING MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY

OFFSITE SAMPLING LOCATION

Sample ID		BR-SS
Analyte (µg/L)	Results	GV
1,4-dioxane	0.576 µg/L	0.35 µg/L
Analyte (ng/L)	Results	GV
PFOA	15.5 ng/L	6.7 ng/L
PFOS	18.9 ng/L	2.7 ng/L



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-22

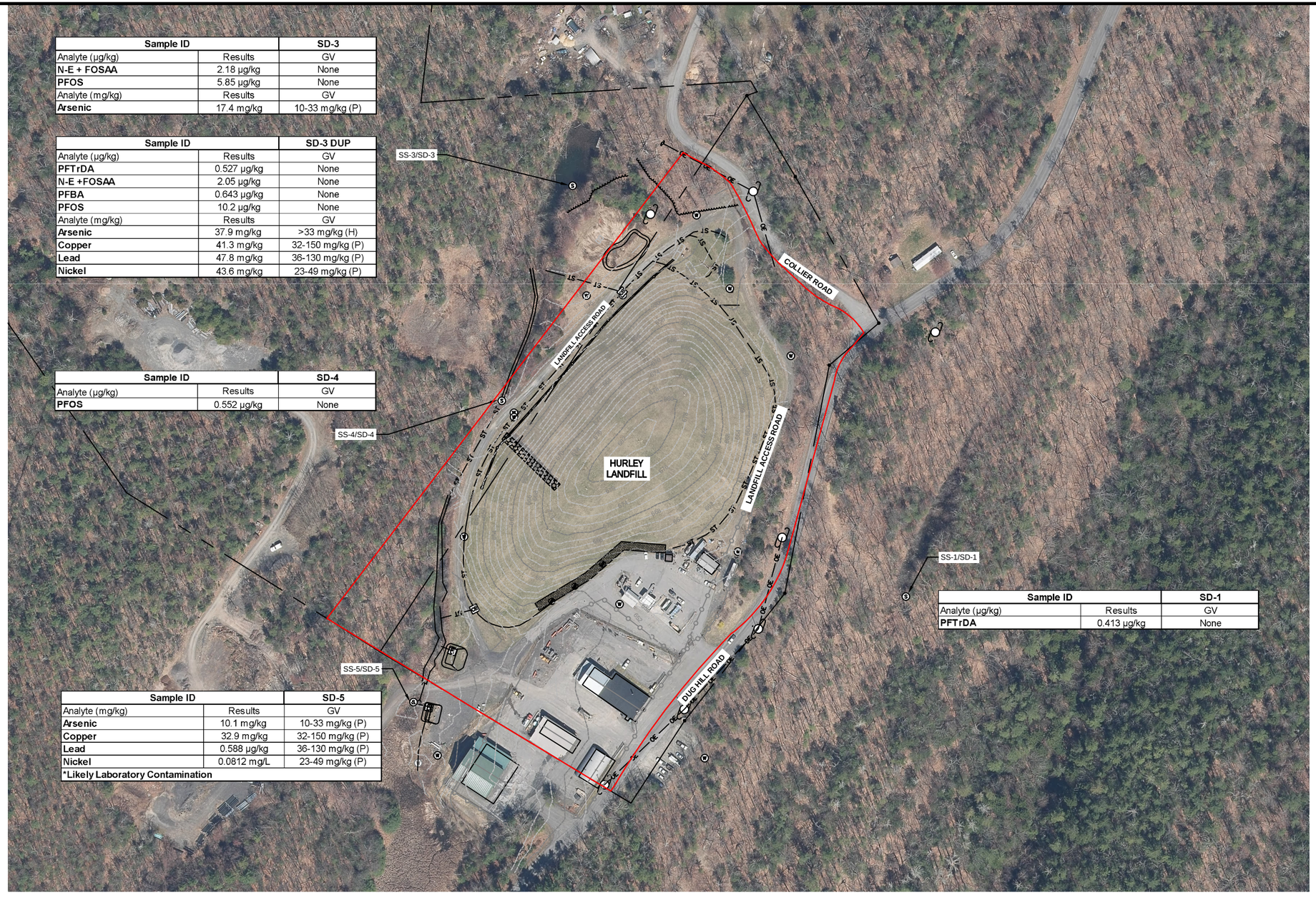
SURFACE WATER EXCEEDANCES (2022)

AECOM

Figure: 6

Last saved by: CARRIE.SZCZEPANSKI(2025-08-21) Last Plotted: 2025-08-22
Filename: D:\TOWN OF HURLEY\FIGURE 7 SEDIMENT SUMMARY (2022)\AECOM 5447.0_SEDIMENT SUMMARY (2022)_FIGURE 7.DWG

Project Management Initials: Designer: Checked: Approved: ANSI B 17" x 11"



Sample ID		SD-3
Analyte (µg/kg)	Results	GV
N-E + FOSAA	2.18 µg/kg	None
PFOS	5.85 µg/kg	None
Analyte (mg/kg)	Results	GV
Arsenic	17.4 mg/kg	10-33 mg/kg (P)

Sample ID		SD-3 DUP
Analyte (µg/kg)	Results	GV
PFTrDA	0.527 µg/kg	None
N-E +FOSAA	2.05 µg/kg	None
PFBA	0.643 µg/kg	None
PFOS	10.2 µg/kg	None
Analyte (mg/kg)	Results	GV
Arsenic	37.9 mg/kg	>33 mg/kg (H)
Copper	41.3 mg/kg	32-150 mg/kg (P)
Lead	47.8 mg/kg	36-130 mg/kg (P)
Nickel	43.6 mg/kg	23-49 mg/kg (P)

Sample ID		SD-4
Analyte (µg/kg)	Results	GV
PFOS	0.552 µg/kg	None

Sample ID		SD-5
Analyte (mg/kg)	Results	GV
Arsenic	10.1 mg/kg	10-33 mg/kg (P)
Copper	32.9 mg/kg	32-150 mg/kg (P)
Lead	0.588 µg/kg	36-130 mg/kg (P)
Nickel	0.0812 mg/L	23-49 mg/kg (P)
***Likely Laboratory Contamination**		

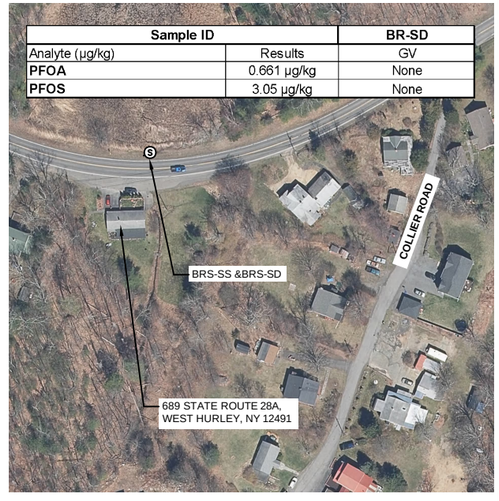
Sample ID		SD-1
Analyte (µg/kg)	Results	GV
PFTrDA	0.413 µg/kg	None

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL
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- EXISTING CULVERT W/FLARED END SECTION
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- EXISTING STORMWATER CATCH BASIN
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- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY

OFFSITE SAMPLING LOCATION

Sample ID		BR-SD
Analyte (µg/kg)	Results	GV
PFOA	0.661 µg/kg	None
PFOS	3.05 µg/kg	None



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-21

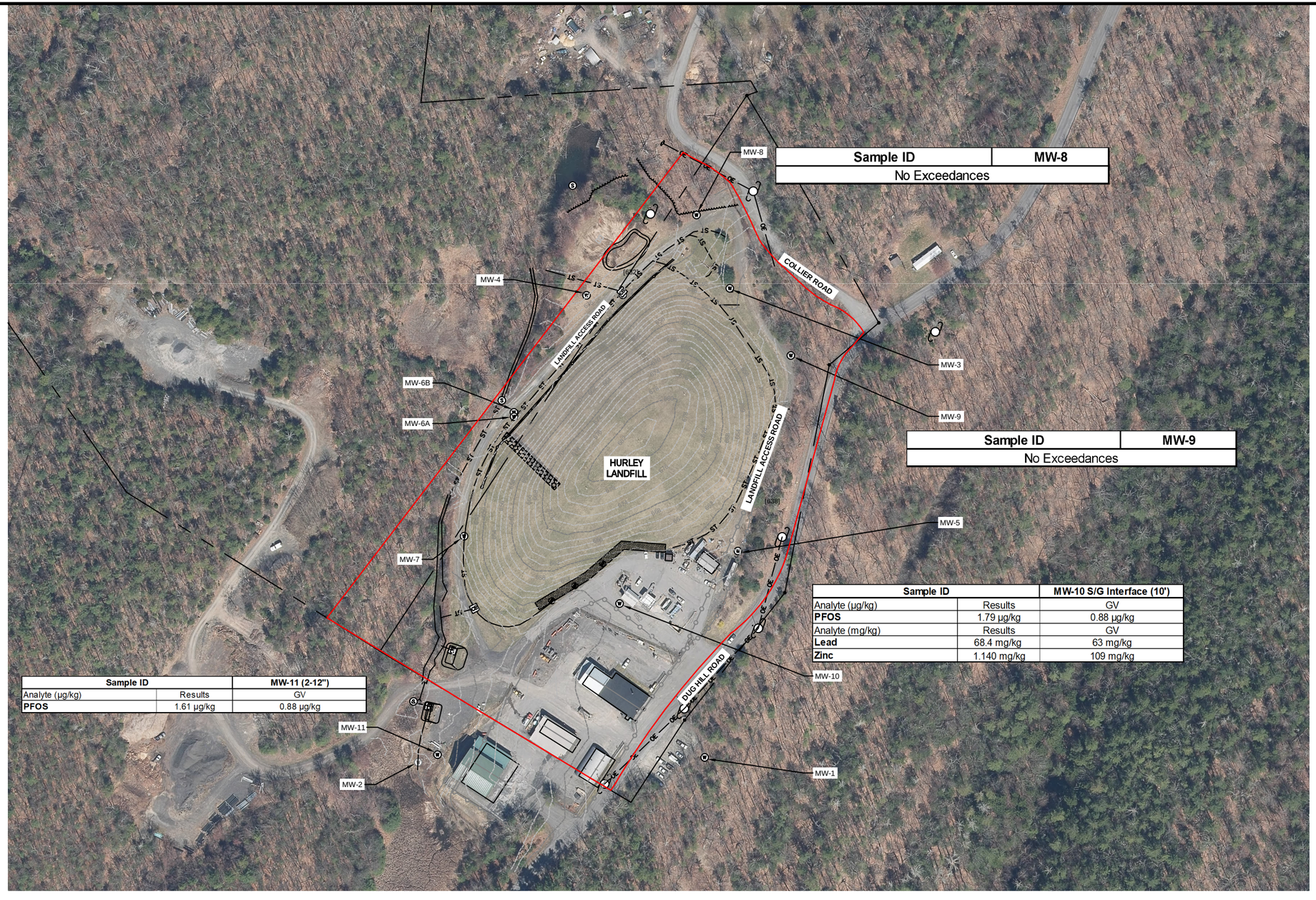
SEDIMENT SUMMARY (2022)

AECOM

Figure: 7

Last saved by: CARRIE.SZCZEPANSKI(2025-08-21) Last Plotted: 2025-08-22
Filename: D:\TOWN OF HURLEY\FIGURE 8 SOIL EXCEEDANCES (2022)\AECOM 5447.0_SOIL EXCEEDANCE (2022)_FIGURE 8.DWG

Project Management Initials: Designer: Checked: Approved: ANSI B 17" x 11"



Sample ID	MW-8
No Exceedances	

Sample ID	MW-9
No Exceedances	

Sample ID		MW-10 S/G Interface (10')
Analyte (µg/kg)	Results	GV
PFOS	1.79 µg/kg	0.88 µg/kg
Analyte (mg/kg)	Results	GV
Lead	68.4 mg/kg	63 mg/kg
Zinc	1,140 mg/kg	109 mg/kg

Sample ID		MW-11 (2-12")
Analyte (µg/kg)	Results	GV
PFOS	1.61 µg/kg	0.88 µg/kg

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- EXISTING MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY

OFFSITE SAMPLING LOCATION



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-08-21

SOIL EXCEEDANCES (2022)

AECOM

Figure: 8

Last saved by: CARRIE.SZCZEPANSKI(2025-12-05) Last Plotted: 2025-12-08
Filename: D:\TOWN OF HURLEY\FIGURE 9 PROPOSED RI SAMPLING LOCATIONS\AECOM 5447.0_PROPOSED RI SAMPLING LOCATIONS_REV1.DWG

Project Management Initials: Designer: E.J.H. Checked: Approved: ANSI B 17" x 11"



LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISITING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- EXISTING CULVERT W/FLARED END SECTION
- EXISTING STORMWATER LINE
- EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- EXISTING MONITORING WELL
- HISTORICAL MONITORING WELL NO LONGER PRESENT
- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- SITE BOUNDARY
- PROPOSED SOIL BORING
- PROPOSED SHALLOW SOIL BORING AND MONITORING WELL
- PROPOSED SURFACE WATER AND SEDIMENT SAMPLE
- PROPOSED DEEP SOIL BORING AND MONITORING WELL

OFFSITE SAMPLING LOCATION



0 200' 400'

1" = 100'

BASEMAP RESOURCE FILES:
1. FIGURE REFERENCED FROM CRAWFORD & ASSOCIATES, MAY 4, 2022, HURLEY LANDFILL INVESTIGATION, SITE PLAN, FIGURE 6.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS-ULSTER COUNTY PARCEL ACCESS.
3. NYS GIS CLEARINGHOUSE AERIAL MAP 2021.

TOWN OF HURLEY LANDFILL
1035 DUG HILL ROAD
TOWN OF HURLEY, NEW YORK
Project No.: 60762183 Date: 2025-12-08

PROPOSED RI SAMPLING LOCATIONS

AECOM

Figure: 9

TABLES

Table 1
Existing Monitoring Well Completion Details

Hurley Town Landfill RIFS WP
West Hurley, NY

Well Name	Northing	Easting	Well Installer	Date Installed	Ground Elevation (ft asml)	Top of Casing (ft amsl)	Depth to Water (top of casing) (ft)	Water Level Elevation (ft amsl)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Boring Depth (ft bgs)
MW-1	1141124.94	598524.96	American Auger Drilling Inc.	2/27/1991	648.66	650.03	10.30	639.73	4.0	48.0	48.35
MW-2	*Historical Well - Abandoned & Removed in 1996*										
MW-3	1141991.97	598569.90	American Auger Drilling Inc.	5/7/1991	648.51	649.37	14.07	635.30	8.0	31.0	31.30
MW-4	1141978.29	598306.87	Boyd Artesian Well Co.	8/20/1996	633.84	635.92	4.70	631.22	15.0	25.0	25.00
MW-5	1141505.96	598587.03	American Auger Drilling Inc.	5/7/1991	658.23	660.07	21.35	638.72	7.0	39.0	39.50
MW-6A	1141754.12	598173.87	American Auger Drilling Inc.	5/9/1991	643.58	645.89	15.80	630.09	8.0	28.0	28.70
MW-6B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	1141533.31	598081.03	American Auger Drilling Inc.	5/8/1991	644.44	645.21	10.65	634.56	8.0	28.0	28.50
MW-8	1142125.14	598510.58	Core Down Drilling	11/23/2022	639.18	640.91	5.25	635.66	16.0	31.0	31.00
MW-9	1141868.14	598682.11	Core Down Drilling	11/22/2022	656.07	657.59	22.30	635.29	36.0	51.0	51.00
MW-10	1141395.51	598316.54	Core Down Drilling	11/21/2022	650.06	650.06	13.00	637.06	27.0	42.0	42.00
MW-11	1141130.98	598031.98	Core Down Drilling	11/18/2022	639.40	641.23	72.00	569.23	77.9	92.9	92.90

Notes:
ft - feet
asml - above mean sea level
bgs - below ground surface
NA - not available
Groundwater monitoring well data obtained from 2023 Crawford & Associates Site Characterization Investigation Report

Table 2
Proposed Sampling Locations and Rationale

Hurley Town Landfill RIFS WP
West Hurley, NY

Location/Sample ID	Type of Samples to be Collected	Area of Sample	Rationale
MW-1	groundwater	Off-site, east of Highway Department and Town Recycling Buildings.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-2			No samping proposed as well is no longer present. MW-11 in close proximity to former location of MW-2.
MW-3	groundwater	On-site, northern portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-4	groundwater	On-site, northwest of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-5	groundwater	On-site, southeast of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-6A	groundwater	On-site, western portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-6B	groundwater	On-site, western portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Well not sampled during the Site Characterization investigation.
MW-7	groundwater	On-site, southwestern portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-8	groundwater	On-site, northern portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-9	groundwater	On-site, eastern portion of landfill, adjacent to Landfill Access Road.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-10	groundwater	On-site, ner Town Recycling Center Buildings.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
MW-11	groundwater	Off-site, southwest of Highway Department and Town Recycling Center Buildings.	Concurrent sampling of all monitoring wells. Groundwater sample to confirm previous sampling.
SB-1	surface/near surface soil	Off-site, northeast of the existing (inactive) 1,000 gallon leachate tanks.	Surface soil sampling location to assess potential impacts from leachate tanks.
SB-2	surface/near surface soil	On-site, inside existing (inactive) 1,000 gallon leachate tanks.	Surface soil sampling location to assess potential impacts from leachate tanks.
SB-3	surface/near surface soil	On-site, next to existing 2,000 gallon leachate tanks.	Surface soil sampling location to assess potential impacts from leachate tanks.
SB-4/MW-12S	subsurface soil/groundwater	On-site west of landfill, south of MW-04.	Shallow monitoring well and sampling location for added coverage downgradient of landfill. South of elevated concentration of PFOA/PFOS in groundwater (MW-4).
SB-5/MW-13S	subsurface soil/groundwater	On-site, east of surface leachate collection system.	Shallow well and sampling location immediately upgradient of surface leachate collection system area and historical seepage area.
SB-6/MW-4D	subsurface soil/groundwater	On-site west of landfill, near MW-04.	Deep downgradient well to assess regional aquifer. Sampling location adjacent to elevated concentration of PFOA/PFOS in groundwater (MW-4).
SB-7/MW-14S	subsurface soil/groundwater	Off-site, north of exisitng (inactive) 1,000 gallon leachate tanks.	Shallow downgradient well and sampling location to assess conditions near the inactive 1,000 gallon leachate tanks.
SB-8/MW-15D	subsurface soil/groundwater	On-site, north of existing 2,000 gallon leachate tanks.	Deep downgradient well to assess regional aquifer. Soil sampling location to assess conditions near the 2,000 gallon leachate tanks.
SB-9/MW-16D	subsurface soil/groundwater	On-site, eastern portion of landfill, adjacent to Landfill Access Road.	Deep downgradient well to assess regional aquifer and triangulate with deep well network.
SB-10/MW-5D	subsurface soil/groundwater	On-site, eastern portion of landfill, adjacent to Landfill Access Road.	Deep downgradient well to assess regional aquifer and triangulate with deep well network.
SW-1/SED-1	surface water/sediment	Off-site, east of Town Recycling Center Buildings.	Surface water/sediment sampling location to to confirm previous sampling.
SW-2/SED-2	surface water/sediment	On-site, near the existing 2,000 gallon leachate tanks.	Wet area was no longer present during previous site visits. Sample will be collected if the matrix is present during sampling activities.
SW-3/SED-3	surface water/sediment	Off-site, northwest of the leachate tanks.	Surface water/sediment sampling location to to confirm previous sampling.
SW-3/SED-4	surface water/sediment	Off-site, west of landfill at the bottom of the stream.	Surface water/sediment sampling location to to confirm previous sampling.
SW-3/SED-5	surface water/sediment	Off-site, southwest of landfill at the bottom of the stream.	Surface water/sediment sampling location to to confirm previous sampling.
SW/SED - 6	surface water/sediment	On-site, southwest of landfill in the middle of the stream.	Surface water/sediment sampling location to investigate discharges from existing stormwater catch basin into the stream.
SW/SED - 7	surface water/sediment	Off-site, west of landfill at the top of the stream.	Surface water/sediment sampling location to investigate potential discharges from existing leachate tanks into the stream.
SW/SED - 8	surface water/sediment	Off-site, north of leachate tanks and landfill.	Surface water/sediment sampling location to assess off-site conditions in the stream/pond near potential sensitive receptors.
SW/SED - 9	surface water/sediment	Off-site, north of leachate tanks and landfill, adjoining Route 28A	Surface water/sediment sampling location to assess off-site conditions in the stream/pond near potential sensitive receptors.
L-1	leachate	On-site, content of southermost existing 2,000 gallon leachate tank.	Leachate sampling location to assess the chemical composition of leachate.
L-2	leachate	On-site, content of 1,000 gallon leachate tank.	Leachate sampling location to assess the chemical composition of leachate.

SB - Soil Boring
MW - Monitoring Well
S - Shallow
D - Deep
SW - Surface Water
SED - Sediment
L - Leachate

Table 3
Proposed Sampling Matrix

Hurley Town Landfill Site RIFS Work Plan
West Hurley, NY

	Soils/Sediments [1][4][5]									Groundwater/Surface Water [1][5]								
	TCL VOCs (8260D)	SVOCs + 1,4 Dioxane (8270E)	PFAS (1633)	PCBs (8082A)	Pesticides (8081B)	Herbicides (8151A)	Cyanide (9012B)	Metals (6020B & 7471B)	TOC (9060A)	TCL VOCs (8260D)	SVOCs (8270E)	PFAS (1633)	1,4-Dioxane (8270E SIM)	PCBs (8082A)	Pesticides (8081B)	Herbicides (8151A)	Cyanide (9012B)	Metals (6020B & 7471B)
MW-1											1	1	1					1
MW-3											1	1	1					1
MW-4											1	1	1					1
MW-5										1	1	1	1	1	1	1	1	1
MW-6A											1	1	1					1
MW-6B											1	1	1					1
MW-7										1	1	1	1	1	1	1	1	1
MW-8											1	1	1					1
MW-9											1	1	1					1
MW-10											1	1	1					1
MW-11											1	1	1					1
SB-1 [4]		1	2					1										
SB-2 [4]	1	1	2	1	1	1	1	1										
SB-3 [4]		1	2					1										
SB-4/MW-12S		1	2					1			1	1	1					1
SB-5/MW-13S		1	2					1		1	1	1	1	1	1	1	1	1
SB-6/MW-4D	1	1	2	1	1	1	1	1		1	1	1	1	1	1	1	1	1
SB-7/MW-14S	1	1	2	1	1	1	1	1		1	1	1	1	1	1	1	1	1
SB-8/MW-15D	1	1	2	1	1	1	1	1		1	1	1	1	1	1	1	1	1
SB-9/MW-16D		1	2					1			1	1	1					1
SB-10/MW-5D		1	2					1		1	1	1	1	1	1	1	1	1
SW/SED - 1		1	1					1	1		1	1	1					1
SW/SED - 2		1	1					1	1		1	1	1					1
SW/SED - 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 4		1	1					1	1		1	1	1					1
SW/SED - 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 6		1	1					1	1		1	1	1					1
SW/SED - 7		1	1					1	1		1	1	1					1
SW/SED - 8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 9		1	1					1	1		1	1	1					1
L-1										1	1	1	1	1	1	1	1	1
L-2										1	1	1	1	1	1	1	1	1
Monitoring Subtotal	7	19	29	7	7	7	7	19	9	12	29	29	29	12	12	12	12	29
QA/QC																		
Duplicates [2]	2	2	3	2	2	2	2	2	1	2	4	4	4	2	2	2	2	4
Matrix Spike [2]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Matrix Spike Duplicate [2]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trip Blanks	4									5								
Field Blanks																		
Equipment Blank [3]	5	5	5	5	5	5	5	5	5	1	1	1	1	1	1	1	1	1
Total Per Matrix Per Parameter	22	30	41	18	18	18	18	30	19	24	38	38	38	19	19	19	19	38

Legend:

6 CRR-NY 375-6.8 Remedial Program Soil Cleanup Objectives (SCOs) Parameters
6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters for Landfills

Notes:

(1) MW-2 is no longer present on-site. SW/SED-2 will be collected if the matrix is present during sampling activities.
(2) Duplicates will be collected at a rate of 1 per 10 samples per media. Matrix Spike and Matrix Spike Duplicate samples will be collected at a rate of 1 per 20 samples per media.
(3) Equipment Blanks will be collected on a basis of one per day or 1 per 20 samples, whichever is greater.
(4) Surface soil samples will only be analzyed for VOCs if visual, olfactory, or other field screening methods identify potential impacts.
(5) Only 30% of all the samples per media will be analyzed for VOCs, pesticides, herbicides, PCB and Cyanide.

MW - Monitoring Well
SB - Soil Boring
SW - Surface Water
SED - Sediment

Table 3
Proposed Sampling Matrix

Hurley Town Landfill Site RIFS Work Plan
West Hurley, NY

	Groundwater/Surface Water (1)(5)															
	Dissolved Metals (6020B & 7471B)	Total Kjeldahl Nitrogen (351.2)	Ammonia-N (SM-4500 NH3B)	Nitrate (300.0)	Chemical Oxygen Demand (Hach 8000)	Biochemical Oxygen Demand (BOD_5) (SM5210B-11)	Total Organic Carbon (9060A, SM5210B-11)	Total Dissolved Soilds (SM52540C-11)	Sulfate (300.0)	Alkalinity (SM-2320B-11)	Phenols (420.1)	Chloride (300.0)	Bromide (300.1)	Total hardness as $CaCO_3$ (SM2340B)	Color (Platinum-Cobalt Method)	Boron (4500-B)
MW-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-6A	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-6B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MW-11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-1 [4]																
SB-2 [4]																
SB-3 [4]																
SB-4/MW-12S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-5/MW-13S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-6/MW-4D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-7/MW-14S	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-8/MW-15D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-9/MW-16D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SB-10/MW-5D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SW/SED - 9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
L-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
L-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Monitoring Subtotal	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
QA/QC																
Duplicates [2]	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Matrix Spike [2]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Matrix Spike Duplicate [2]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trip Blanks																
Field Blanks																
Equipment Blank [3]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Per Matrix Per Parameter	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

Legend:

6 CRR-NY 375-6.8 Remedial Program Soil Cleanup Objectives (SCOs) Parameters
6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters for Landfills

Notes:

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(5) Only 30% of all the samples per media will be analyzed for VOCs, pesticides, herbicides, PCB and Cyanide.

MW - Monitoring Well

SB - Soil Boring

SW - Surface Water
SED - Sediment

APPENDICES

APPENDIX A

Quality Assurance Project Plan

AECOM

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Remedial Investigation and Feasibility Study

Town of Hurley Landfill
1043 Dug Hill Road
West Hurley, New York
NYSDEC State Superfund Program
Site No. 356062

Prepared for:

Town of Hurley
10 Wamsley Place,
Hurley, New York

Prepared by:

AECOM USA, Inc.
40 British American Boulevard
Latham, New York 12110

December 2025, Rev.1

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Remedial Investigation and Feasibility Study

Town of Hurley Landfill
1043 Dug Hill Road
West Hurley, New York
NYSDEC State Superfund Program
Site No. 356062

December 2025, Rev.1

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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned investigative activities and establish the criteria for performing these activities at a predetermined quality for the work conducted by AECOM, for the Hurley Town Landfill Site (NYSDEC Superfund Program Site No. 356062) located at 1043 Dug Hill Road in the Town of Hurley, New York (the Site). The location of the project site is shown on Remedial Investigation Work Plan (RIFS WP) **Figure 1** The QAPP is intended to be a companion document to the site-specific RIFS WP.

Project work will be conducted in general accordance with the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

1.2 PROJECT MANAGEMENT AND ORGANIZATION

1.2.1 Personnel

The general responsibilities of key AECOM project personnel are listed below.

Project Manager – Abdiel Lopez Torres, PG, will have responsibility for overall project management and coordination with the client and NYSDEC, and will coordinate the initiation and implementation of the Site activities as well as coordinate subcontractors.

Field Team Leader – Chris French, of AECOM's Latham, NY office, will be responsible for coordinating field activities including soil boring advancement, monitoring well installation and sampling, slug testing, soil sampling, and leachate, surface water and sediment sampling.

Quality Assurance Officer – Robert Montione, of AECOM's Latham, NY office, will serve as the Project Quality Assurance Officer (QAO) for this project. The QAO will be responsible for oversight of the data validation and laboratory subcontractors, as well as data usability reports. The QAO will work with the database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC submittal requirements.

Health & Safety (H&S) Officer – Caroline Lee, AECOM SH&E Manager, will be responsible for oversight of the preparation of the project Health and Safety plan (HASP), approving it, and tracking of its implementation.

Database Manager – Maxwell Reis, of AECOM's Buffalo, NY office, will serve as database manager. The database manager is responsible for verifying that laboratory deliverables meet AECOM and NYSDEC electronic deliverable specifications, and for preparing the final EQuIS deliverable for submission to NYSDEC.

Data Validation – Peter Fairbanks of AECOM's Buffalo, NY office, a certified validator, will be assigned for data quality review and data usability summary report (DUSR).

1.2.2 Specific Tasks and Services

AECOM will obtain the following subcontractor specialists for services relating to:

Laboratory Analysis – Hampton-Clarke, Inc. (HC), New Jersey laboratory has been assigned for laboratory analytical services for the project. HC is certified for aqueous and non-aqueous matrices.

All laboratories to be used for the project shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. PFAS analysis via EPA Method 1633 for solid and aqueous samples will be subcontracted by HC to SGS for analysis. SGS is ELAP certified for PFAS analysis of solid and aqueous samples. Copies of the applicable ELAP certifications for each laboratory to be used during the project are provided in this QAPP. Each laboratory maintains its own QA/QC program and employs the required staff to implement this program. The QA Officer for each laboratory is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, and this QAPP.

Field surveying and mapping – Grant E. McEwen, PLS of KHEOPS Architecture, Engineering & Survey, DPC Buffalo, NY office, will provide land surveying support. Mr. Rozeski is a NYS-licensed land surveyor.

1.3 SITE DESCRIPTION AND LOCATION

Detailed background data on the site, including the site description and location, site history, previous investigations, and current conditions, are summarized in the in the site-specific RIFS WP.

The Site is located in the Town of Hurley, in Ulster County, New York at 1043 Dug Hill Road. The Site location is approximately 0.6 miles south of the Ashokan Reservoir and approximately 8 miles west of the Hudson River. The Site is located in a combined rural and residential area. A Site Location Map is provided as Figure 1.

The inactive hazardous waste disposal site (IHWDS) is a 13.01-acre Site encompassing portions of two (2) tax parcels, the majority of the Hurley Town Landfill (landfill), south of Colliers Road (Parcel ID: 47.1-3-15) and lands of the Town of Hurley west of the landfill (Parcel ID: 47.1-3-19). The Site consists of the approximately 5-acre closed landfill with an associated leachate collection system, a stream and wetland areas to the west, as well as an office building formerly occupied by the Town of Hurley Highway Department, an active waste transfer and recycling station, truck and equipment garages and salt storage structure to the south. A Site Plan is provided as Figure 2.

The Site consists of an approximately 5-acre closed landfill with an associated leachate collection system, a marsh area adjoining a riverine and pond to the west, as well as the Hurley Highway Department buildings and Town Recycling Center (referenced as municipal buildings), which occupy the southern portion of the Site.

Historical information pertaining to the Site was sourced from the Site Characterization Investigation Report prepared by Crawford & Associates (C&A), dated July 2023 (Appendix A). The Site historically operated as a municipal solid waste (MSW) landfill from the 1960s to the 1990s. During this period, records indicate the disposal of MSW, construction and demolition (C&D) debris, brush, logs and metal filings. It has been reported that at the inception of the landfill, waste was placed directly onto the soil and rock surface without a protective liner.

Landfill closure activities were conducted in the 1990's by Lawler, Matusky & Skelly Engineers (LMS) on behalf of Morris Associates and the Town. Closure activities included a closure investigation which recommended the installation of an engineered cover system, a passive gas venting infrastructure comprising of gas vents and a gas venting trench, and a leachate collection system. The leachate collection system below the cap was constructed along the western edge of the landfill and includes 548 linear feet of perforated collection line draining into two 2,000-gallon tanks. This collection line is installed along bedrock, or a to a maximum depth of 12 inches below

ground surface (bgs) (this is the case in the vicinity of MW-4), where high groundwater was encountered during installation. A surface leachate collection system was constructed in 2001 consisting of a berm and 2-1,000-gallon tanks to capture a seep that developed post-closure. An underground storage tank (UST) with a capacity of 10,000 gallons was also installed to provide additional leachate storage capacity. Following the closure of the landfill and the installation of the surface leachate collection system, the Town has been transporting leachate off-site at the City of Kingston Wastewater Treatment Plant for treatment and disposal.

In 2007, the Town installed a stormwater conveyance system to manage runoff from the landfill cap directing it to a drainage swale. In 2012 it was reported that groundwater in downgradient monitoring wells contained higher concentrations of inorganics and some heavy metals when compared to an up-gradient well. From 2013 to 2021, annual monitoring was not completed at the landfill. In 2017, groundwater sampling was performed by the NYSDEC Division of Materials Management (DMM), which identified PFAS (PFOA and PFOS) and 1,4-dioxane in multiple wells. Additional sampling was conducted by NYSDEC in downgradient residential supply wells between the years 2018 and 2020, the result of which confirmed the presence of PFAS contamination.

In January of 2022 a Notice of Violation (NOV) was issued to the Town of Hurley Landfill for multiple violations of 6NYCRR Part 360 Solid Waste Management Facility regulations observed during an inspection of the Site. The Town was directed to cease the discharge of leachate and begin disposal at an authorized facility. An Order on Consent and Administrative Settlement was executed between the NYSDEC and Town of Hurley in February of 2022. In early 2022, general maintenance and improvements were made to the system. This included clearing vegetative overgrowth, performing the inspection of and/or repairing tanks, containment areas and the surface leachate collection system. Inspection of the tanks revealed a lack of secondary containment for both 1,000-gallon tanks, possibly including the 10,000-gallon tank, as well as liquid observed in the secondary containment of the 2,000-gallon tanks.

In 2023, C&A completed a Site Characterization Investigation (SCI) involving the installation of four bedrock wells, and sampling of groundwater, surface water, soil, sediment and leachate. Investigation results confirmed the presence of PFAS in the landfill and in six of the ten groundwater samples collected. Other exceedances were limited to 1,4-dioxane and several metals such as iron, sodium and aluminum. Further information on the 2023 C&A investigation is included in Section 2.3 of this work plan.

A total of 11 monitoring wells are installed at the Site. MW-1, MW-3, MW-6A and MW-7 were installed by American auger Drilling under LMS in 1991 as part of the landfill closure activities. The original MW-4 was installed in 1991, but was replaced and drilled 65 feet southwest from the original by Boyd Artesian Well Inc. in 1996. MW-8 though MW-11 were installed by Core Down Drilling under C&A as part of the 2023 Site Characterization Investigation. MW-1 is located up-gradient and southeast of the landfill. Historical monitoring well MW-2 was abandoned and removed in 1996, and current MW-11 was installed near its location, to the southwest of the landfill and near a wetland area. MW-10 is located to the south of the gas venting trench, directly south of the landfill. All remaining wells (MW-3 through MW-9) are located downgradient of the landfill. Monitoring well construction details are included as Table 1.

According to the records search 2023 C&A SCI Report, the Highway Department area has one open and three closed underground storage tanks. (UST PBS – NY: Facility ID NY33333). Three spills have been reported to the NYDEC Spills Database as follows:

- NYSDEC Spill Number 9806705, Spill Date August 31, 1998, Cause of Spill is identified as a tank failure. During tank removal activities (1,000-gal diesel fuel tank), contaminated soil was encountered and stockpiled. The amount of material spilled is listed as 0 gallons. Spill Closure Date is listed as May 14, 1999 & cleanup work is listed as not meeting state standards.
- NYSDEC Spill Number 9908569, Spill Date October 14, 1999, Cause of Spill is identified as abandoned drums which impacted a small stream. Citizen reported that two 275 gallon petroleum tanks were dumped behind the highway garage in the recycling center and that the tanks were leaking material which was running into a small stream and nearby swamp area – caller was concerned that the Town may bury the tanks on-site. Spill Closure Date is listed as December 30, 1999 and state standards are listed as having been met.

2.0 SITE INVESTIGATION

Site investigation procedures are provided below.

2.1 Field Sampling Procedures

Field activities are detailed in the RIFS WP. Activities will include soil borings advancement, monitoring well installation, groundwater sampling of existing and new monitoring wells, and collection of leachate, surface water and sediment. The need for a Soil Vapor Investigation is not anticipated at this time. A Soil Vapor Investigation might be considered upon evaluation of the RI data results.

2.2 Equipment Decontamination

To avoid cross-contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the procedures specified in the RIFS WP.

Field equipment rinsate blanks (see Section 3.6.1) are generated and analyzed to monitor the effectiveness of field decontamination procedures.

Cross-contamination is minimized by the use of vendor-decontaminated, dedicated, disposable equipment to the extent practical.

2.2.1 Decontamination Procedures

A decontamination pad will be constructed on the site. The pad will be sized to be large enough to handle the equipment used on site (e.g., drill rig). The pad will also be used for small equipment decontamination as well as personnel decontamination.

2.2.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment such as groundwater samplers, transducer probes and cables, etc., will be accomplished using the following procedures:

- Alconox (or equivalent) and potable water wash;
- Potable water rinse; and
- Distilled/deionized water rinse (certified PFAS free).

Solvents will not be used in the field decontamination procedure. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute. PFAS-free water, to be provided by the laboratory, will be utilized when PFAS sampling occurs.

Equipment should be allowed to dry prior to use. Steam cleaning or high pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Where groundwater will be collected using bladder pumps. dedicated bladder pump sleeves, sample tubing and silicone pump tubing will be used at each monitoring well. The bladder pump housing will be decontaminated as described above.

2.2.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use during this project, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal, unless other arrangements are made on a project-specific basis and as indicated in the RIFS WP.

2.2.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the RIFS WP, or HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures are provided in the HASP.

3.0 SAMPLE HANDLING

3.1 SAMPLE IDENTIFICATION AND LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier.

The general sample identification format follows.

MW = Monitoring Well

SB = Soil Boring

SS = Surface Soil

SW = Surface Water

SED = Sediment

SD = Historic sediment sample nomenclature by C&A

(Note: For clarity of presentation and consistency, new sediment samples collected at historic sampling locations will continue to be labeled per the original sample name given by the previous consultant (i.e. SS-01/SD-01).

IA = Indoor Air

OA (or AA) = Outdoor (or ambient) Air

SSV = Sub-slab Soil Vapor

L = Leachate

EB = Field Equipment (Rinsate) Blank

FD = Field Duplicate

TB = Trip Blank

XX = Numerical sample identifier (up to five characters). This will ordinarily be the number of the monitoring well, sediment, surface water, leachate or soil boring location from which the sample was obtained.

For the newly installed monitoring wells, these wells will be denoted with an “S” or a “D” following the well ID number to indicated whether the wells are shallow or deep monitoring wells e.g. MW-14D).

As part of the unique identifier, the sample date will be included following any location that may have more than one sample collected in any given time period. The format will be MMDDYY. For example, MW-01S that is sampled on May 24, 2011 will be MW-01S -052411.

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using FD followed by the date followed by a numerical identifier in sequence for each duplicate sample collected for that day (e.g., FD-060319-1 would be the first field-duplicate taken on 06/03/2019). The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the Project Manager. As the field duplicates are blind to the laboratory, the NYSDEC Valid Value for a field

duplicate (FD) along with the identification of the parent sample will be done by AECOM after the EQuIS deliverable is received from the laboratory.

Refer to the RIFS WP for examples of the numbering system.

Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink:

- Site name, location, and job number;
- Sample identifier;
- Company (AECOM)
- Date and time;
- Sampler's initials;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment, air); and,
- Requested analyses.

3.2 SAMPLE BOTTLES, PRESERVATION, AND HOLDING TIME

Table 1 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed on this project. Sample bottle requirements, preservation, and holding times are discussed further below.

3.2.1 Sample Containers

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements, and any regulatory protocol requirements.

Sample bottles will be provided by the analytical laboratory and will conform to the requirements of the USEPA Specifications and Guidance for Contaminant-Free Sample Containers. Aqueous samples for volatile organic compound (VOC) analysis will be collected in 40-mL vials with Teflon™ septa. Samples for PFAS will be collected using HDPE bottles and segregated from any bottle ware containing Teflon™.

3.2.2 Sample Preservation

Samples will be preserved as summarized on Table 1.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. The pH of samples will be spot-checked in the field and additional preservative will be added as needed. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the AECOM Quality Assurance Officer (QAO). If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified or additional preservative will be added in the field by the sampling team.

3.2.3 Holding Times

Contractual holding times (see Table 1) are calculated from the validated time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC Analytical Services Protocol (ASP) 2005 with 2008 update for TO-15 analysis.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip

blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.3 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody (COC) form will trace the path of sample containers from the project site to the laboratory. COC forms are typically provided by the analytical laboratory.

Sample bottle tracking sheets or the COC will be used to track the containers from the laboratory to the containers' destination. The Project Manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4º C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

3.4 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. Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO 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.

Discrepancies between the COC and samples received by the laboratory will be brought to the attention of AECOM Project Manager by the laboratory within 24 hours upon receipt. AECOM Project Manager will address these discrepancies within 48 hours of initial notification.

3.4.1 Laboratory Sample Custody

The laboratory must satisfy the sample chain-of-custody requirements by implementing the following procedures 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); and
- Transfers of samples in and out of storage are documented.

3.4.2 Sample Storage, Security, and Disposal

While in the laboratory, the samples and aliquots that require storage at 4° 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 so that:

- Samples and extracts are stored for 60 days after the final analytical data report has been submitted to AECOM. The samples, extracts, and digestates are then disposed by the laboratory in accordance with laboratory SOPs and applicable regulations.
- Samples are not stored with standards or sample extracts.

4.0 DATA QUALITY REQUIREMENTS

4.1 ANALYTICAL METHODS

Soil and water sample analyses will utilize USEPA SW-846 methods as listed below.

Analytical and extraction/sample preparation methods typically used are shown on Table 1 and summarized below.

Investigation Analyses:

- Target Compound List (TCL) VOCs plus TICs – SW-846 Method 8260D
- TCL SVOCs plus TICs – SW-846 Method 8270E
- TCL Pesticides – SW-846 Method 8081B
- PCBs – SW 846 Method 8082A
- Target Analyte List (TAL) metals – SW-846 Method 6020B/7471B
- 1,4-dioxane by EPA Method 8270E Selective Ion Monitoring (SIM)
- 40 PFAS compounds by EPA Method 1633 Revision A (December 2024)
- Total Organic Carbon - Method 9060A / Lloyd Kahn
- Cyanide – Method 9012B

Due to the potential leachate migration, surface water, groundwater and leachate samples will be analyzed for routine landfill parameters as specified in 6 CRR-NY 363-4.6 (h), Table 1: Routine Parameters. It is noted that several of these parameters are incorporated in the previously listed analyte lists (i.e. TAL Metals). It is also noted that field parameters will be collected with the instrumentation specified in Section 4.4 and are not subject to laboratory analysis. Analytical and extraction/sample preparation methods typically used are shown on Table 1 and summarized below (CAS number in parenthesis where applicable).

- Total Kjeldahl Nitrogen – Method 351.2
- Ammonia (7664-41-7) – Method SM-4500 NH3B
- Nitrate – Method 300.0
- Chemical Oxygen Demand – Method Hach 8000
- Biochemical Oxygen Demand (BOD_5) – Method SM5210B-11
- Total Dissolved Solids – Method SM52540C-11
- Sulfate – Method 300.0
- Alkalinity – Method SM-2320B-11
- Phenols (108-95-2) – Method 420.1
- Chloride – Method 300.0
- Bromide (24959-67-9) – Method 300.1
- Total hardness as $CaCO_3$ – Method SM2340B
- Color – Method
- Boron (7440-42-8) – Method

Analytical methods are presented in the NYSDEC Analytical Services Protocol (ASP), 2005. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it pertaining to New York State work. Full Category B deliverables will be required.

AECOM has selected H-C to provide laboratory analytical services for this project. The proposed laboratory is certified by the NYSDOH Environmental Laboratory Approval Program. The laboratory is in good standing for the applicable parameter groups.

4.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQO) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP will be used in assessing the uncertainty associated with decisions related to this site.

4.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is based on the DQOs established for the project. The method detection limit is determined in accordance with the procedure in ASP Exhibit A, section 4.9.2.12, which is consistent with the procedure in 40 CFR Part 136 Appendix B.

The reporting limit (RL) for non-detected analytes will be the lowest calibration standard associated with the analysis. Reporting limits will be equal to or lower than those presented in Exhibit C of ASP 2005 for the applicable method. Analytes detected at concentrations below the RL but above the MDL will be flagged "J" (estimated) by the laboratory. Typical RLs are summarized on Table 2. PFAS compound specific RLs by EPA Method 1633, Revision A (December 2024) are listed in Table 3.

The reporting limits and MDLs of the assigned laboratory will be reviewed by AECOM's QAO for each project to verify that the laboratory sensitivity is sufficient to meet the project objectives. These will typically include meeting the applicable standards, criteria, and guidance (SCGs) including soil

cleanup objectives (6 NYCRR 375-6.8), supplemental soil cleanup objectives (NYSDEC, October 2010 and Sampling, Analysis, and Assessment of PFAS, April 2023), sediment guidance values (compiled in Screening and Assessment of Contaminated Sediment, June 2014), groundwater and surface water criteria (compiled in TOGS 1.1.1, and subsequent addendum, and 6 NYCRR 703.5(f), 2004), and indoor air screening levels (NYSDOH, 2006, and subsequent revisions).

4.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Matrix spike duplicate analyses will be performed once for every 20 samples for VOCs.

Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (RPD):

$$RPD = 100 \times 2(|X_1 - X_2|) / (X_1 + X_2)$$

where:

> X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is ≤ 50% RPD for all matrices for analytes detected at concentrations at least 2 times the reporting limit. Where one or both analytes are detected at less than 2 times the RL, the criterion is the absolute difference “D” ($X_1 - X_2$), and D should be less than the RL for the analyte.

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent method recovery criteria and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike or laboratory control will be performed once for every analytical batch or as specified in the method or ASP. Other method-specific laboratory QC samples (such as continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\% \text{ Recovery} = 100 \times (SSR\text{-}SR)/SA$$

Where:

SSR = Spiked sample Result;

SR = Sample Result; and

SA = Spike Added.

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples. Accuracy values can be presented in a variety of ways. For this project, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (R/S) \times 100$$

Where:

S = surrogate spike concentration; and

R = reported surrogate compound concentration.

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all laboratories follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the US Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other laboratories operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability within any specific project is also assessed by comparison of the project data to data generated previously; and, if available, comparison of the data for multiple sampling events conducted for the project. Comparability (consistency) of sampling techniques is also assessed, to some extent,

by analysis of field duplicates; although it should be noted that large differences between field duplicates may result from a wide variety of causes, not just inconsistent sampling.

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data for all planned samples. Completeness of 100 percent indicates that all planned samples were collected; and the resultant data were fully valid and acceptable. As completeness is a function of both field activities and laboratory activities, separate completeness goals are established for each.

The default goal for sampling completeness is 95 percent, as is calculated as:

$$\text{Sampling Completeness (\%)} = (Sc/Sp) \times 100$$

Where:

Sc = Samples collected (submitted) for analysis (documented from field records or COC); and

Sp = Samples planned (as documented in the RIFS WP or QAPP).

The default goal for analytical completeness is also set at 95 percent. Analytical completeness may be less than 100 percent either due to systemic failures that result in the rejection or loss of data for an entire sample; or compound-specific rejection (e.g., 2-hexanone) within an otherwise valid analysis.

For typical projects, the default overall completeness goal is 90 percent useable data. The impact of rejected or unusable data will be made on a case-by-case basis. If the goals of the project can be achieved without the missing datum or data, or if data from a different sampling event can be used to fill the data gap, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be “demonstrated analyte-free.” The criteria for analyte-free water are based on the USEPA-assigned values for the Contract Required Quantitation Limits (CRQLs) for Contract Laboratory Program (CLP) analyses, or the RL for SW-846 or other methods.

However, specifically for the common laboratory contaminants (acetone and 2-butanone), the allowable limits are five times the CRQL (or RL). For methylene chloride, the limit is 2.5 times the CRQL. For common SVOC contaminants (phthalate esters such as bis(2-ethylhexyl) phthalate), the limit is 5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte-free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

Table 2 of this QAPP shows QA/QC samples and reporting limits. QA/QC samples are discussed below.

4.3.1 Field Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Rinsate blanks are not required when samples are collected directly into laboratory-provided sample containers (e.g., if specified as such in the RIFS WP for matrices such as surface water).

Field (Equipment Rinsate) blanks for bailers and pump tubing: For initial sampling, as well as at subsequent rounds of sampling when bailers or tubing is reused, a section of each type of tubing used per sampling batch or one bailer per batch will be used to generate equipment (rinsate) blanks during groundwater sampling. Disposable bailers and tubing will be obtained from a single vendor for this project. One rinsate blank will be collected for each groundwater sampling event to verify that the vendor decontamination was adequate, and that contamination has not occurred during shipment and storage.

Field (Equipment Rinsate) blanks for drilling tooling: For each event where soil borings, hand-clearing (i.e. hand auger), or drilling equip (i.e. shoe, acetate sleeves) will be decontaminated, One rinsate blank will be collected for each soil boring collection event to verify that the vendor supplies and equipment decontamination in the field was adequate and that cross-contamination has not occurred during field decontamination.

Typically, one rinsate blank will be collected for every 20 field samples collected or one per week, whichever is more frequent, for each type of sampling equipment and each media type. PFAS equipment blanks will be collected once per day per site and minimum 1 equipment blank per 20 samples. The rinsate equipment blanks will be collected from the soil, surface water, leachate and groundwater sampling equipment as noted in Table 2.

4.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method.

Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day.

Soil or sediment duplicate samples are collected from a single location and device (e.g., split spoon sampler). Soil or sediment duplicates for VOC analysis are collected first, without homogenization. If other parameters are being analyzed, the remaining soil is homogenized (e.g., by mixing in a clean stainless steel bowl) and prior to generating the sample and duplicate.

Air/soil vapor field duplicates are typically collected by utilizing a “T” fitting on the sample line and splitting the air between two Summa canisters of the same size and set to the same flow rate. Air/soil vapor sampling is not anticipated during the RIFS WP.

The default field duplicate precision (RPD) objective is ≤50% percent RPD for all matrices where the sample concentration is at least two times the reporting limit. Where the analyte is detected in both samples but the concentration is less than 2 times the reporting limit, precision is assessed by the absolute difference, which should be less than the reporting limit. The RPD is not calculable when the analyte is not detected in one or both analyses. A more detailed discussion of the calculation is provided in Section 4.2.2 (Precision), above.

Field duplicates will be collected at a frequency of one per 10 environmental samples for aqueous and non-aqueous sample.

4.3.3 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the laboratory to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis.

Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

4.3.4 Temperature Blanks

The 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 will contain an individual temperature blank (if used).

4.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging and sampling (for well stabilization) of wells prior to sampling for laboratory samples. Field testing will also be performed during the collection of surface water and leachate samples. Field QC checks of control limits for pH, specific conductance (conductivity), and turbidity are detailed below. In lieu of parameter-specific equipment, the use of a multi-parameter water quality meter (e.g. Horiba U-51-10) is acceptable. The use of the multi-parameter water quality meter will conform to specifications listed below and in accordance with the manufacturer's specifications. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings. Calibration logs for the instruments discussed below will be provided in the RIFS WP.

4.4.1 pH Meter

The pH meter is calibrated daily, using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by more than 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter daily. Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride (KCl) solutions in accordance with manufacturer's recommendations.

4.4.3 Turbidity

The turbidity meter should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be checked daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar).

4.4.4 Temperature

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor

instrument performance. It is recommended that the instrument temperature reading be checked against a NIST-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

4.5 LABORATORY QUALITY ASSURANCE

4.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

4.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a matrix spike and a matrix spike duplicate (MS/MSD) for volatile organics.

4.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: matrix spikes and matrix spike duplicates (MS/MSD), which are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD samples will be analyzed at a frequency of one (pair) for every 20 samples. In addition, matrix spike blanks (MSBs) will also be prepared and analyzed by the laboratory as required by NYSDEC ASP.

4.5.4 Laboratory Control Sample

A fortified clean matrix (laboratory control sample, or LCS) is analyzed with each analysis. In some cases a “Laboratory-Fortified Blank” (LFB) may serve as the LCS. These samples generally consist of a standard aqueous or solid matrix fortified with the analytes of interest for single-analyte methods and selected analytes for multi-analyte methods according to the appropriate analytical method. The LCS may be analyzed in duplicate for some methods (LCSD). The analyte recovery from each analysis (LCS and LCSD) is used to monitor analytical accuracy; analytical precision can be assessed from evaluation of the LCS/LCSD in the same manner as the MS/MSD.

5.0 FIELD DATA DOCUMENTATION

Field reporting documentation will be performed, including field notes and field data reporting forms. Field notes will be prepared and maintained throughout the course of the investigation. Due to PFAS sampling, only loose paper and forms on metal clipboards will be used for field notes. The field notes will be maintained as a permanent part of the project file.

Field note entries will be recorded in indelible, waterproof ink. If errors are made in any field notes, field record (form), COC, or any other field record document, corrections will be made by crossing a single line through the error, entering the correct information, and initialing and dating the correction.

Standard Forms have been adopted in the RIFS WP to facilitate the collection of consistent data (see RIFS WP Appendix D). This will preclude detailed documentation of, for example, lithologic descriptions in the field notes. A reference, however, to use of each specific form must be made in the field notes.

The date will be placed at the top of every page in the left-hand corner. The time of entry recordings will be in columnar form down the left-hand side of the page. At the beginning of each day, the first two entries will be “Personnel/Contractors On Site” and “Weather.” At the end of each day's entry or particular event, if appropriate, the person entering the field notes should draw a diagonal line originating from the bottom left corner of the page to the conclusion of the entry and sign along the line indicating the conclusion of the entry or the day's activity.

Entries in the field notes will be legible (printing is preferable) and will contain accurate and inclusive documentation of project activities (investigation, monitoring remediation, closure, maintenance, etc.). Information pertaining to health and safety aspects, personnel on site, visitor’s names, association, and time of arrival/departure, etc., should also be recorded. Language should be objective, factual, and free of personal feelings or other terminology that might prove inappropriate, since field records are the basis for later written reports. Once completed, these field notes become accountable documents and must be maintained as part of the project files.

Sample collection and handling activities, as well as visual observations, will be documented in the field notes. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field notes. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded in the field notes, except where these are referenced as being recorded on approved field forms. Field analyses and measurements must be traceable to the specific piece of field equipment utilized and to the field investigator collecting the sample, making the measurement, or conducting analyses. Field notes will be updated as field work progresses.

The field notes will be stored in the Project File (electronic and/or hard copy, at a specified office location). Copies of specific sections will be made available to personnel upon request.

All field records (e.g., drilling logs, well construction forms, sampling records, COCs, aquifer testing forms) will be completed the day the associated activity occurs. Field data collected using electronic data loggers or computer entry forms, will be downloaded as soon as practical onto an electronic storage device (i.e. USB or other) or uploaded to office servers or Share Point (depending on the selection of the PM). If possible, the person collecting the data will download electronic data on a daily basis. This person will be responsible for verifying that the data collected are adequately represented in electronic media and in the file.

6.0 EQUIPMENT CALIBRATION AND MAINTENANCE

Quality assurance for instrumentation and equipment used for a project is 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.

6.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples typically includes a turbidimeter (turbidity per EPA Method 180.1), pH meter (pH per EPA Method 150.1), conductivity meter (specific conductance per EPA Method 120.1), thermometer, and organic vapor analyzer. See also Section 4.4 of this QAPP for additional discussion.

The organic vapor analyzer (OVA) (i.e., miniRAE 3000 PID or similar) used for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion

A four-gas meter will be used by field personnel to provide continued monitoring of potential harmful gases (i.e. methane, etc.) that could be released during ground intrusive activities at/near the landfill and negatively impact on-site personnel. Additional information on the four-gas meter calibration is provided in the site-specific Health and Safety Plan (HASP).

6.2 LABORATORY EQUIPMENT CALIBRATION

Laboratory equipment will be calibrated according to the method-specific requirements of the 2005 NYSDEC ASP**,** Exhibit E, Parts II and III, and maintained following professional judgment and the manufacturer's specifications, and additional requirements as specified in the ELAP certification manual.

6.2.1 Calibration Procedure

Written procedures are used for all instruments and equipment subject to calibration. For chemical analyses typically performed for these contracts, the calibration procedures are specified in the methods as compiled in the ASP. 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.

6.2.2 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.

6.2.3 Calibration Reference Standards

Two types of reference standards will be used by the analytical laboratory 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 (SRMs) provided by the National Institute of Standards and Technology (NIST) or USEPA, may also include vendor-certified materials traceable to NIST or USEPA SRMs. These are primarily used for operational calibration.

6.2.4 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.

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.

6.2.5 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.

6.3 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 a standard response (calibration) curve and often the analysis of blanks.

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. For most methods, five calibration standards are used, with the concentration of the lowest calibration standard being the reporting or quantitation limit for that analysis. Sample measurements are made and reported within this working range; apparent concentrations which exceed the high end of the calibrated range (“E”-flagged data for organic analyses) are diluted (or a smaller sample is used) and re-analyzed. The calibration curve is prepared by plotting or performing a linear regression of the instrument responses against the analyte concentration.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the RIFS WP, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

7.1 LABORATORY DATA REPORTING AND 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 (milligram per kilogram [mg/kg] or milligram per liter [mg/L]) or parts per billion (µg/kg or µg/L) 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 standard operating procedures consistent with the data handling requirements of the applicable methods.

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2005 revision of the NYSDEC ASP. ASP Deliverables are either Category B (full deliverables; similar to USEPA CLP requirements) or Category A (a reduced deliverable level). For this project, Category B deliverables are the default and will be provided for all deliverables generated under the project unless explicitly indicated otherwise on a site-specific basis. Laboratory data reports will conform to NYSDEC Category B deliverable requirements, as specified in Exhibit B, Part II.E, Sections 2 and 3, respectively.

Copies of the laboratory's generic Quality Assurance Management Plan (QAMP, as defined in ASP 2005 Exhibit E, Part I) will be maintained at AECOM's principal contact office (Latham, NY). The laboratory's QAMP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

To meet NYSDEC electronic data deliverable (EDD, Version 5 or latest) requirements, subcontract laboratories will be required to submit electronic deliverables in an EQuIS 4-file format consistent with AECOM standards (see Attachment 1). AECOM's database manager will be responsible for verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel file to the data validator; uploading the validated data into the database; overseeing the uploading of any other data (field data, boring log information, etc.), and submitting a final EQuIS deliverable to NYSDEC that meets NYSDEC EDD requirements.

In addition to the electronic copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form (submitted electronically). The data spreadsheet will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

7.2 DATA VALIDATION

Data generated for this RIFS will be validated by a qualified data validator. The validator, Peter Fairbanks, will follow guidelines established in the USEPA Region 2 SOPs (latest versions) applicable to the analytical method(s) being reviewed. These SOPs are checklists which are designed to formally

and rigorously assess the quality and completeness of SW-846 and air sample TO-15 analysis data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements).

Validation reports and DUSRs will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text. Where QC failures caused the laboratory to perform a re-analysis, the data validator will make a recommendation as to which of the two analyses should be used. Data review will also include an assessment of sensitivity (i.e., are reporting limits appropriate to determine if contaminants are present at or above action levels or other applicable threshold values).

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the Region 2 SOPs, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use.

7.3 DATA USABILITY

AECOM's Quality Assurance (QA) staff will prepare a DUSR which will be provided as part of the RIFS Report, encompassing both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets.

The QA Officer will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Data which has not been validated and field data used for the project will be discussed in the data usability summary, including any limitations on the use of such data.

7.4 FIELD DATA VERIFICATION

Field personnel will record all field data in field logs (hard copy or electronic) and on standard forms. After checking the validity of the data in the field notes, the Project Manager or his/her designee will reduce the data to tabular form, when possible, by including the data into data electronic files. The data files will be set up for direct input into the project database. Subjective data will be saved electronically with the project data for later review by the Project Manager and incorporation into technical reports, as appropriate.

Verification of field data will be performed at two different levels. The first level of data verification will be performed at the time of collection by following internal standard operating procedures (SOPs) and QC checks. The second level of review consists of the Project Manager, Deputy Project Manager, or other competent personnel, reviewing the data to confirm that the correct codes and units have been included. After data reduction into tables and arrays is complete, the Field Team Leader 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.

8.0 PERFORMANCE AND SYSTEM AUDITS

Audits are systematic checks to determine the quality of operation of some activity or function in the field or laboratory. Field audits are conducted to verify adherence to proper field and sampling procedures. Audits are of two types, as described below.

- 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 laboratory's 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.

8.1 RESPONSIBILITY, AUTHORITY, AND TIMING

QA audits to be conducted for the project may include system, performance, and data audits. The Project QAO will keep a tentative schedule on record that details the number and types of audits.

8.2 FIELD AUDITS

Field performance audits, if specified, will be conducted during the project 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 maintain 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:

- Field activities conducted in substantial compliance with the SC/RIFS WP;
- 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 by field personnel;
- 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; and
- 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.

8.3 LABORATORY PERFORMANCE AND SYSTEM AUDITS

The laboratory assigned to this project will been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the matrices and analytical protocols to be used. Therefore, no project-specific audit of the laboratory(s) will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of AECOM.

8.4 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 QAO 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.

8.5 AUDIT DOCUMENTATION

A checklist will be completed during each audit so that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures. The checklist will detail the activities to be executed as part of the auditing plan. Audit checklists will be prepared in advance and will be available for review. Following each system, performance, and data audit, the auditor or QAO will prepare a report to document the findings of the specific audit.

9.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its quality management system (QMS) program, AECOM provides relevant excerpts and conclusions from data validation reports to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

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.

9.1 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.

9.2 CORRECTIVE ACTION METHODS

9.2.1 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.

9.2.2 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.

9.2.3 Corrective Action Steps

For long-term corrective actions, steps comprising closed-loop corrective action system 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; and
- 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 laboratory's Quality Assurance Manager.

9.2.4 Audit-Based Non-Conformances

Following audits, corrective action is initiated by documenting the audit finding and recommended corrective action on an Audit Finding Report.

9.3 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 AECOM project management.

10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

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 project 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; and
- 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 RIFS WP; and
- Status of implementation of the RIFS WP.

Project status reporting will include aspects of quality control that were pertinent during the month’s activities. Problems revealed during review of the month’s activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to the project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

11.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocol (ASP) Manual*. July.

NYSDEC, 2008. *NYSDEC Modifications to EPA Region 9 TO-15 QA/QC Criteria provided in the July 2005 ASP*. February 2008.

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NYSDOH, 2007. Letter from Gary Litwin (Director) to Dale Desnoyers (NYSDEC DER) re: Soil Vapor/Indoor Air Matrices. (Adds additional chlorinated VOCs to the original matrices in the 2006 SVI guidance). June 25.

USEPA Region 2, Standard Operating Procedures for Data Review. Available at https://www.epa.gov/quality/region-2-quality-assurance-guidance-and-standard-operating-procedures.

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NYSDEC, 2006. 6 NYCRR 375-6.8 Soil Cleanup Objectives. Effective December 14, 2006.

NYSDEC, 2010b. DER-10 Technical Guidance for Site Investigation and Remediation..

NYSDEC, April 2023. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), Under NYSDEC's Part 375 Remedial Programs.

Tables

Table 1

Sample Bottle, Volume, Preservation, and Holding Time Summary
Town of Hurley Landfill Site Quality Assurance Project Plan
West Hurley, NY

MATRIX/ANALYSIS	Sample Prep Method [1]	Analytical Method [2]	Sample Bottles [3]				Minimum Vol Rqd	Preservation [4]	Holding Time [4,5]		Comment
			Mat'l	Size	Qty	Source			Extraction	Analysis	
Aqueous Samples											
Volatile Organics + TICs	SW 846 5030C	SW 846 8260D	Glass	40 mL	3	Lab	40 mL	HCl to pH ≤ 2	NA	14 days	7 days if not preserved.
Semivolatile Organics + TICs	SW 846 3510C	SW 846 8270E	Glass	1 L	2	Lab	250 mL	None	7 days	40 days	
Pesticides	SW 846 3510C	SW 846 8081B	Glass	1 L	2	Lab	250 mL	None	7 days	40 days	
PFAS Compounds	EPA Method 1633	EPA Method 1633	HDPE	500 mL	2	Lab	500 mL	None	14 days	28 days	
1,4-Dioxane	SW 846 3510C	SW846 8270E SIM	Glass	1 L	2	Lab	1,000 mL	None	7 days	40 days	
PCBs	SW 846 3510C	SW 846 8082A	Glass	1 L	2	Lab	250 mL	None	365 days	40 days	
Metals (except mercury)	SW 846 /3010A	SW 846 6020B	Plastic	1 L	1	Lab	200 mL	HNO_3 to pH≤ 2	180 days	180 days	180 days for TAL metals except Hg.
Mercury	SW 846 7470A	SW 846 7470A							28 days	28 days	28 days for Hg.
Dissolved Metals (except mercury)	SW 846 /3010A	SW 846 6020B	Plastic	1 L	1	Lab	200 mL	HNO_3 to pH≤ 2 (after filtering)	180 days	180 days	180 days for TAL metals except Hg.
Dissolved Mercury	SW 846 7470A	SW 846 7470A							28 days	28 days	28 days for Hg.
Cyanide	SW 846 9012B	SW 846 9012B	Plastic	250 mL	1	Lab	60 mL	NaOH to pH >12	14 days	14 days	
Total Kjeldahl Nitrogen	EPA Method 351.2	EPA Method 351.2	Plastic	1 L	1	Lab	1 L	H2SO4<2	28 days	28 days	
Ammonia-N	Standard Method 4500 NH3 B	Standard Method 4500 NH3 D	Plastic	250 mL	1	Lab	250 mL	H2SO4<2	28 days	28 days	
Nitrate	EPA Method 300.0	EPA Method 300.0	Plastic	50 mL	1	Lab	50 mL	None	48 hours	48 hours	
Chemical Oxygen Demand	Hach/EPA Method 8000	Hach/EPA Method 8000	Plastic	250 mL	1	Lab	250 mL	H2SO4<2	28 days	28 days	
Biochemical Oxygen Demand (BOD_5)	Standard Method 5210B	Standard Method 5210B	Plastic	1 L	1	Lab	1 L	None	48 hours		
Total Organic Carbon	EPA Method 9060A	EPA Method 9060A	Glass	50 mL	1	Lab	50 mL	H2SO4	28 days	28 days	
Total Dissolved Soilds	Standard Method 2540C	Standard Method 2540C	Plastic	250 mL	1	Lab	250 mL	None	7 days	7 days	
Sulfate	EPA Method 300.0	EPA Method 300.0	Plastic	50 mL	1	Lab	50 mL	None	28 days	28 days	
Alkalinity	Standard Method 2320B	Standard Method 2320B	Glass	60 mL	3	Lab	60 mL	None	14 days	14 days	
Phenols	EPA Method 420.1	EPA Method 420.1	Glass	50 mL	1	Lab	50 mL	H2SO4<2	28 days	28 days	
Chloride	EPA Method 300.0	EPA Method 300.0	Plastic	50 mL	1	Lab	50 mL	None	28 days	28 days	
Bromide	EPA Method 300.0	EPA Method 300.0	Plastic	50 mL	1	Lab	50 mL	None	28 days	28 days	
Total hardness as $CaCO_3$	SW 846 /3010A	Standard Method 2340B	Plastic	1 L	1	Lab	200 mL	HNO3<2	6 months	6 months	
Color		Standard Method 2120B	Glass	250 mL	1	Lab	250 mL	None	48 hours	48 hours	
Boron	SW 846 /3010A	SW 846 6010D	Plastic	1 L	1	Lab	200 mL	HNO3<2	6 months	6 months	
Non-Aqueous Samples											
Volatile Organics + TICs	SW 846 5035A	SW 846 8260D	Encore	5 or 25 g	3 or 1	Vendor [7]	5 g	None	NA	48 hours [8]	
Semivolatile Organics (+ 1,4 Dioxane) + TICs	SW 846 3550C	SW 846 8270E	Glass	8 oz [6]	1	Lab	30 g	None	14 days	40 days	
Pesticides	SW 846 3541	SW 846 8081B	Glass			Lab	30 g	None	14 days	40 days	
Herbicides	SW 846 8151A	SW 846 8151A	Glass			Lab	60 g	None	14 days	40 days	
PCBs	SW 846 3541	SW 846 8082A	Glass			Lab	30 g	None	365 days	40 days	
Metals (except mercury)	SW 846 3050B	SW 846 6020B	Glass			Lab	10 g	None	NA	180 days	180 days for TAL metals except Hg.
Mercury	SW 846 7471B	SW 846 7471B					2 g		NA	28 days	
PFAS Compounds	EPA Method 1633	EPA Method 1633	HDPE	4 oz	1	Lab	4 oz	None	14 days	28 days	
Cyanide	SW 846 9012B	SW 846 9012B	Glass	4 oz	1	Lab	20 g	None	NA	14 days	
TOC	Llyod Khan	Llyod Khan	Glass	4 oz	1	Lab	10 g	None	NA	14 days	

(1) Laboratory may propose alternate extraction/preparation methods, subject to AECOM approval.
(2) More recent versions of SW-846 methods may be used subject to AECOM approval.
(3) Bottles typical. EnCore samplers for VOCs in soil will be provided by laboratory or AECOM on a case-by-case basis.
(4) All samples for chemical analysis should be held at 4 degrees C in addition to any chemical preservation required.
(5) Holding time calculated from day of collection, unless noted as being from time of extraction. Laboratory holding times (ASP 2005, Exhibit I) are two days shorter to allow for field handling and shipping.
(6) A single 8-oz sample is sufficient for SVOCs, pesticides, herbicides, PCBs, and metals.
(7) Encore samplers are typically purchased from an outside supplier by AECOM but may also be requested (for a fee) from the analytical laboratory.
(8) Encore samplers must be prepared/preserved in the laboratory within 48 hours of collection. Soil samples in glass bottles and preserved Encores have a 14 day (total) holding time.
SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Modernizing Ignitable Liquids Determinations Rule, April 2019. On-line: https://www.epa.gov/hw-sw846/federal-register-notices-related-sw-846#updatev
EPA = Compendium of Methods for the Determination of Toxic Organics in Air, Second Edition (EPA/625/R-96/010b; 1999).
TICs - Tentatively Identified Compounds
GTCL - Glass with Teflon lined cap

Table 2

Reporting Limits and QA/QC Sample Quantity Summary
Town of Hurley Landfill Site Quality Assurance Project Plan
West Hurley, NY

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit -Typical (units as specified)	Field Sample Quantity	Field Duplicate [2]	Matrix Spike (MS) or LCS [2]	MS Duplicate or Matrix Duplicate [2]	Trip Blanks [2]	Field Blank [3]	Equipment Blank [4]	Total Analyses
Investigation Samples, Aqueous - Surface and Groundwater											
Volatile organics + TICs	SW 846 8260D	Hampton-Clarke	1.0 µg/L	12	2	2	2	5	0	1	24
Semivolatile organics + TICs	SW 846 8270E	Hampton-Clarke	2 µg/L	29	4	2	2	0	0	1	38
Pesticides	SW 846 8081B	Hampton-Clarke	0.01 µg/L	12	2	2	2	0	0	1	19
Herbicides	SW 846 8151A	Hampton-Clarke	0.5 µg/L	12	2	2	2	0	0	1	19
PFAS Compounds	EPA Method 1633	SGS	See QAPP, Table 3	29	4	2	2	0	0	1	38
1,4-Dioxane	SW846 8270E SIM	Hampton-Clarke	0.1 µg/L	29	4	2	2	0	0	1	38
PCBs	SW 846 8082A	Hampton-Clarke	0.25 µg/L	12	2	2	2	0	0	1	19
Metals (TAL except Hg)	SW 846 6020B	Hampton-Clarke	Analyte-specific	29	4	2	2	0	0	1	38
Mercury	SW 846 7470A	Hampton-Clarke	0.5 µg/L	29	4	2	2	0	0	1	38
Dissolved Metals (TAL except Hg)	SW 846 6020B	Hampton-Clarke	Analyte-specific	29	4	2	2	0	0	1	38
Dissolved Mercury	SW 846 7470A	Hampton-Clarke	0.5 µg/L	29	4	2	2	0	0	1	38
Cyanide	SW 846 9012B	Hampton-Clarke	20 ug/L	12	2	2	2	0	0	1	19
Total Kjeldahl Nitrogen	EPA Method 351.2	Subcontractor [5]	200 ug/L	29	4	2	2	0	0	1	38
Ammonia-N	Standard Method 4500 NH3 D	Hampton-Clarke	1000 µg/L	29	4	2	2	0	0	1	38
Nitrate	EPA Method 300.0	Hampton-Clarke	1000 µg/L	29	4	2	2	0	0	1	38
Chemical Oxygen Demand	Hach/EPA Method 8000	Hampton-Clarke	10000 µg/L	29	4	2	2	0	0	1	38
Biochemical Oxygen Demand (BOD_5)	Standard Method 5210B	Hampton-Clarke	2000 µg/L	29	4	2	2	0	0	1	38
Total Organic Carbon	EPA Method 9060A	Hampton-Clarke	5000 µg/L	29	4	2	2	0	0	1	38
Total Dissolved Soilds	Standard Method 2540C	Hampton-Clarke	40000 µg/L	29	4	2	2	0	0	1	38
Sulfate	EPA Method 300.0	Hampton-Clarke	2000 µg/L	29	4	2	2	0	0	1	38
Alkalinity	Standard Method 2320B	Hampton-Clarke	10000 µg/L	29	4	2	2	0	0	1	38
Phenols	EPA Method 420.1	Hampton-Clarke	50 µg/L	29	4	2	2	0	0	1	38
Chloride	EPA Method 300.0	Hampton-Clarke	2000 µg/L	29	4	2	2	0	0	1	38
Bromide	EPA Method 300.0	Hampton-Clarke	1000 µg/L	29	4	2	2	0	0	1	38
Total hardness as $CaCO_3$	Standard Method 2340B	Hampton-Clarke	6600 µg/L	29	4	2	2	0	0	1	38
Color	Standard Method 2120B	Subcontractor [5]	NA	29	4	2	2	0	0	1	38
Boron	SW 846 6010D	Hampton-Clarke	200 µg/L	29	4	2	2	0	0	1	38
Investigation Samples, Solid - Soil/Sediment											
Volatile organics + TICs	SW 846 8260D	Hampton-Clarke	2 µg/kg [1]	7	2	2	2	4	0	5	22
Semivolatile organics + TICs	SW 846 8270E	Hampton-Clarke	330 µg/kg [1]	19	2	2	2	0	0	5	30
Pesticides	SW 846 8081B	Hampton-Clarke	1 - 5 µg/kg [1]	7	2	2	2	0	0	5	18
Herbicides	SW 846 8151A	Hampton-Clarke	10 µg/kg [1]	7	2	2	2	0	0	5	18
PFAS Compounds	EPA Method 1633	SGS	See QAPP, Table 3	29	3	2	2	0	0	5	41
PCBs	SW 846 8082A	Hampton-Clarke	25 µg/kg [1]	7	2	2	2	0	0	5	18
Metals (TAL except Hg)	SW 846 6020B	Hampton-Clarke	Analyte-specific	19	2	2	2	0	0	5	30
Mercury	SW 846 7471B	Hampton-Clarke	83 µg/kg [1]	19	2	2	2	0	0	5	30
TOC (sediment only)	Lloyd Kahn	Hampton-Clarke	1300 mg/kg	9	1	2	2	0	0	5	19
Cyanide	SW 846 9012B	Hampton-Clarke	240 µg/kg	7	2	2	2	0	0	5	18

Notes

(1) Reporting limits for soils, when adjusted for dry weight, will be higher. Detections above the MDL but less than reporting limits will be reported and flagged estimated (J).
(2) Duplicates will be collected at a rate of 1 per 10 samples per media. Matrix Spike and Matrix Spike Duplicate samples will be collected at a rate of 1 per 20 samples per media.
(3) Equipment Blanks will be collected on a basis of one per day or 1 per 20 samples, whichever is greater.
(4) Field Blanks for PFAS aqueous samples will be collected on a basis of one per day or 1 per 20 samples, whichever is greater.
(5) Laboratory analysis will be subcontracted by Hampton-Clarke. Subcontractor to be determined, and subject to AECOM approval.

TICs - Tentatively Identified Compounds
TAL - Target Analyte List (23 Metals)
µg/L - micrograms per liter
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
NA - not applicable

Table 3

PFAS Compound Reporting Limits By EPA Method 1633, Revision A
Town of Hurley Landfill Site Quality Assurance Project Plan
West Hurley, NY

Group	Analyte Description	Abbreviation	CAS Number	Groundwater, Surface Water			Soil, Sediment		
				RL	MDL	Units	RL	MDL	Units
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5	0.002	0.00066	µg/l	0.20	0.07	µg/kg
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4	0.002	0.00100	µg/l	0.20	0.10	µg/kg
	Perfluorohexanesulfonic acid	PFHxS	355-46-4	0.002	0.00110	µg/l	0.20	0.11	µg/kg
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8	0.002	0.00098	µg/l	0.20	0.10	µg/kg
	Perfluorooctanesulfonic acid	PFOS	1763-23-1	0.002	0.00043	µg/l	0.20	0.05	µg/kg
	Perfluorononanesulfonic acid	PFNS	68259-12-1	0.002	0.00140	µg/l	0.20	0.14	µg/kg
	Perfluorodecanesulfonic acid	PFDS	335-77-3	0.002	0.00110	µg/l	0.20	0.11	µg/kg
	Perfluorododecanesulfonic acid (PFDoS)	PFDoS	79780-39-5	0.002	0.00040	µg/l	0.20	0.05	µg/kg
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4	0.008	0.00093	µg/l	0.80	0.11	µg/kg
	Perfluoropentanoic acid	PFPeA	2706-90-3	0.004	0.00073	µg/l	0.40	0.07	µg/kg
	Perfluorohexanoic acid	PFHxA	307-24-4	0.002	0.00029	µg/l	0.20	0.03	µg/kg
	Perfluoroheptanoic acid	PFHpA	375-85-9	0.002	0.00050	µg/l	0.20	0.05	µg/kg
	Perfluorooctanoic acid	PFOA	335-67-1	0.002	0.00075	µg/l	0.20	0.08	µg/kg
	Perfluorononanoic acid	PFNA	375-95-1	0.002	0.00040	µg/l	0.20	0.05	µg/kg
	Perfluorodecanoic acid	PFDA	335-76-2	0.002	0.00062	µg/l	0.20	0.07	µg/kg
	Perfluoroundecanoic acid	PFUnA	2058-94-8	0.002	0.00055	µg/l	0.20	0.06	µg/kg
	Perfluorododecanoic acid	PFDoA	307-55-1	0.002	0.00077	µg/l	0.20	0.08	µg/kg
	Perfluorotridecanoic acid	PFTrDA	72629-94-8	0.002	0.00079	µg/l	0.20	0.09	µg/kg
	Perfluorotetradecanoic acid	PFTeDA	376-06-7	0.002	0.00076	µg/l	0.20	0.10	µg/kg
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6	0.008	0.00180	µg/l	0.80	0.18	µg/kg
	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ADONA	919005-14-4	0.008	0.00120	µg/l	0.80	0.12	µg/kg
	Perfluoro-3-methoxypropanoic acid (PFMPA)	PFMPA	377-73-1	0.004	0.00030	µg/l	0.40	0.03	µg/kg
	Perfluoro-4-methoxybutanoic acid (PFMBA)	PFMBA	863090-89-5	0.004	0.00056	µg/l	0.40	0.06	µg/kg
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6	0.004	0.00130	µg/l	0.40	0.13	µg/kg
Fluorotelomer sulfonic acids	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2)	4:2-FTS	757124-72-4	0.008	0.00230	µg/l	0.80	0.28	µg/kg
	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	6:2-FTS	27619-97-2	0.008	0.00091	µg/l	0.80	0.10	µg/kg
	1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	8:2-FTS	39108-34-4	0.008	0.00150	µg/l	0.80	0.19	µg/kg
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5	0.010	0.00240	µg/l	1.00	0.24	µg/kg
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3	0.050	0.00710	µg/l	5.00	0.62	µg/kg
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4	0.050	0.00620	µg/l	5.00	0.63	µg/kg
Perfluorooctane sulfonamides	Perfluorooctanesulfonamide	PFOSA	754-91-6	0.002	0.00069	µg/l	0.20	0.07	µg/kg
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8	0.002	0.00064	µg/l	0.20	0.06	µg/kg
	N-ethylperfluoro-1-octanesulfonamide	NEtFOSA	4151-50-2	0.002	0.00053	µg/l	0.20	0.05	µg/kg
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9	0.002	0.00051	µg/l	0.20	0.08	µg/kg
	N-ethylperfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6	0.002	0.00091	µg/l	0.20	0.13	µg/kg
Perfluorooctane sulfonamide ethanols	2-(N-methylperfluoro-1-octanesulfonamido) ethanol	MeFOSE	24448-09-7	0.020	0.00280	µg/l	2.00	0.28	µg/kg
	2-(N-ethylperfluoro-1-octanesulfonamido) ethanol	EtFOSE	1691-99-2	0.020	0.00380	µg/l	2.00	0.73	µg/kg
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1	0.008	0.00240	µg/l	0.80	0.26	µg/kg
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9	0.008	0.00180	µg/l	0.80	0.18	µg/kg
	Perfluoro (2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7	0.004	0.00027	µg/l	0.40	0.03	µg/kg

Notes:
RL = Reporting Limit
MDL = Method Detection Limit
µg/l = micrograms per liter
µg/kg = micrograms per kilogram

Attachment 1

ATTACHMENT 1

AECOM Electronic Data Deliverable Specification

Documentation of the structure and contents of the EDD is now provided directly by the EQuIS Data Processor (EDP). Click the **EDD Description** button in the **Tools** section of the **Home** ribbon section of EDP. The AECOM format file and EDP software (for data providers that do not have it already) are available from http://www.earthsoft.com/products/edp/edp-format-for-aecom/. The format will have to be "registered" when first launched in EDP.

Each EDD will comprise 4 files, to describe samples, tests, results, and batches. The format file has two different sections for samples, Field and Lab, only one of which can be included in the EDD. Which sample section to use will be communicated by the AECOM data manager at project setup.

Submittal

The EDD file can be in one of the following formats:

- ZIP archive of tab-delimited text files (.txt)
- spreadsheet (.xls or .xlsx)
- database (.mdb)

Regardless of the method of EDD Submittal, EDD Packages must be named using a specific naming convention.
EDD File Name:
<Unique ID>.<Facility Code>.AECOM.{zip | xls | xlsx | mdb}

ZIP archive text file EDD section names:
<Unique ID>.<EDD Section Name>.txt

XLS worksheet MDB table EDD section names:
<EDD Section Name>

Where:
<Unique ID> = A unique identifier which will be the Sample Delivery Group name unless other arrangements have been made.
<Facility Code> = The facility code for the facility to which this EDD will be loaded, will be communicated by the AECOM data manager at project setup.
<EDD Section Name> = The name of the section within the EDD (i.e. AECOMLabSMP or AECOMFSample, AECOMLabTST, AECOMLabRES, AECOMLabBCH) as it appears in EDP.
Between each of the name elements is a "." (period). It is very important that it is a period and not a "-" (dash), "_" (underscore), or any other character.

Resubmittal

EDD packages may be resubmitted. However, in order to resubmit corrected EDDs, the files must each be renamed, regardless of the reason(s) for resubmittal.
Example: A lab originally submits an EDD Package (.zip) file named "20100129.MySite.AECOM.zip" which contains EDDs named "20100129.AECOMFSample.txt," etc. If the lab later makes a change to one of the EDDs, it would have to submit a new EDD Package named "20100129R.MySite.AECOM.zip" with EDDs named "20100129R.AECOMFSample.txt," etc.

Reference Values

A Reference Values file should be delivered from the AECOM data manager to the data provider at project setup. No EDDs will be accepted that do not strictly adhere to the project-specific reference values. If new values need to be used, they must be identified and explained to the AECOM data manager who will provide approval or alternate codes to use before any EDD should be submitted.

For the NYSDEC projects, the reference values can be accessed at
http://www.earthsoft.com/products/edp/edp-format-for-nysdec/

Attachment 2

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised July 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. OLGA AZARIAN
SGS NORTH AMERICA INC - DAYTON
2235 ROUTE 130
DAYTON, NJ 08810

NY Lab Id No: 10983

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260D
	EPA 624.1
Acrylonitrile	EPA 8260D
	EPA 624.1
Ethyl methacrylate	EPA 8260D
Methyl acrylonitrile	EPA 8260D
Methyl methacrylate	EPA 8260D

Amines

1,2-Diphenylhydrazine	EPA 625.1
	EPA 8270E
1,4-Phenylenediamine	EPA 8270E
1-Naphthylamine	EPA 8270E
2,3-Dichloroaniline	EPA 625.1
2-Naphthylamine	EPA 8270E
2-Nitroaniline	EPA 8270E
3-Nitroaniline	EPA 8270E
4-Chloroaniline	EPA 8270E
4-Nitroaniline	EPA 8270E
5-Nitro-o-toluidine	EPA 8270E
a,a-Dimethylphenethylamine	EPA 8270E
Aniline	EPA 625.1
	EPA 8270E
Carbazole	EPA 625.1
	EPA 8270E
Diphenylamine	EPA 8270E
Methapyrilene	EPA 8270E
Pronamide	EPA 8270E

Serial No.: 71174

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Amines	
Propionitrile	EPA 8260D
Pyridine	EPA 625.1
	EPA 8270E
Benzidines	
3,3'-Dichlorobenzidine	EPA 625.1
	EPA 8270E
3,3'-Dimethylbenzidine	EPA 8270E
Benzidine	EPA 625.1
	EPA 8270E
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081B
	EPA 608.3
4,4'-DDE	EPA 8081B
	EPA 608.3
4,4'-DDT	EPA 8081B
	EPA 608.3
Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B
	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3
Chlorobenzilate	EPA 8270E

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Chlorinated Hydrocarbon Pesticides

delta-BHC	EPA 8081B
	EPA 608.3
Diallate	EPA 8270E
Dieldrin	EPA 8081B
	EPA 608.3
Endosulfan I	EPA 8081B
	EPA 608.3
Endosulfan II	EPA 8081B
	EPA 608.3
Endosulfan sulfate	EPA 8081B
	EPA 608.3
Endrin	EPA 8081B
	EPA 608.3
Endrin aldehyde	EPA 8081B
	EPA 608.3
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Isodrin	EPA 8270E
Kepone	EPA 8270E
Lindane	EPA 8081B
	EPA 608.3
Methoxychlor	EPA 8081B
	EPA 608.3

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Chlorinated Hydrocarbon Pesticides

Mirex	EPA 8081B
PCNB	EPA 8270E
Toxaphene	EPA 8081B
	EPA 608.3

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
1,2,4,5-Tetrachlorobenzene	EPA 8270E
1,2,4-Trichlorobenzene	EPA 625.1
	EPA 8270E
2-Chloronaphthalene	EPA 625.1
	EPA 8270E
Hexachlorobenzene	EPA 625.1
	EPA 8270E
Hexachlorobutadiene	EPA 625.1
	EPA 8270E
Hexachlorocyclopentadiene	EPA 625.1
	EPA 8270E
Hexachloroethane	EPA 8260D
	EPA 625.1
	EPA 8270E
Hexachloropropene	EPA 8270E
Pentachlorobenzene	EPA 8270E

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A

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Chlorophenoxy Acid Pesticides

2,4-DB	EPA 8151A
Dalapon	EPA 8151A
Dicamba	EPA 8151A
Dichloroprop	EPA 8151A
Dinoseb	EPA 8151A
	EPA 8270E
Pentachlorophenol	EPA 8151A

Demand

Biochemical Oxygen Demand	SM 5210B-2016
Carbonaceous BOD	SM 5210B-2016
Chemical Oxygen Demand	SM 5220C-2011

Dissolved Gases

Ethane	RSK-175
Ethene (Ethylene)	RSK-175
Methane	RSK-175
Propane	RSK-175

Fuel Oxygenates

Di-isopropyl ether	EPA 8260D
Ethanol	EPA 8260D
	EPA 8015D
Methyl tert-butyl ether	EPA 8260D
	EPA 624.1
tert-amyl methyl ether (TAME)	EPA 8260D
tert-butyl alcohol	EPA 8260D
	EPA 8015D
tert-butyl ethyl ether (ETBE)	EPA 8260D

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Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 625.1
	EPA 8270E
4-Bromophenylphenyl ether	EPA 625.1
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 625.1
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 625.1
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 625.1
	EPA 8270E

Low Level Halocarbons

1,2,3-Trichloropropane, Low Level	EPA 8011
1,2-Dibromo-3-chloropropane, Low Le	EPA 8011
1,2-Dibromoethane, Low Level	EPA 8011

Low Level Polynuclear Aromatics

Acenaphthene Low Level	EPA 8270E SIM
Acenaphthylene Low Level	EPA 8270E SIM
Anthracene Low Level	EPA 8270E SIM
Benzo(a)anthracene Low Level	EPA 8270E SIM
Benzo(a)pyrene Low Level	EPA 8270E SIM
Benzo(b)fluoranthene Low Level	EPA 8270E SIM
Benzo(g,h,i)perylene Low Level	EPA 8270E SIM
Benzo(k)fluoranthene Low Level	EPA 8270E SIM
Chrysene Low Level	EPA 8270E SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270E SIM
Fluoranthene Low Level	EPA 8270E SIM

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WADSWORTH CENTER

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Revised July 16, 2025

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Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. OLGA AZARIAN
SGS NORTH AMERICA INC - DAYTON
2235 ROUTE 130
DAYTON, NJ 08810

NY Lab Id No: 10983

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Low Level Polynuclear Aromatics

Fluorene Low Level	EPA 8270E SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270E SIM
Naphthalene Low Level	EPA 8270E SIM
Phenanthrene Low Level	EPA 8270E SIM
Pyrene Low Level	EPA 8270E SIM

Metals I

Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)

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Metals I

Iron, Total	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

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Metals I

Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Strontium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B

Metals II

Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium VI	EPA 7196A
	EPA 7199
	SM 3500-Cr B-2011

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Metals II

Mercury, Low Level	EPA 245.7, Rev. 2.0 (2005)
	EPA 1631E
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 7470A
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

Metals III

Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Molybdenum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D

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Metals III

Thallium, Total	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Tin, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Titanium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

Mineral

Acidity	SM 2310B-2011
Alkalinity	SM 2320B-2011
Chloride	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Hardness, Total	SM 2340C-2011
	SM 2340B-2011
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A

Miscellaneous

Boron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 200.8, Rev. 5.4 (1994)
Bromide	EPA 300.0, Rev. 2.1 (1993)

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Miscellaneous

Bromide	EPA 9056A
Color	SM 2120B-2011
Cyanide, Total	EPA 335.4, Rev. 1.0 (1993)
	EPA 9012B
non-Polar Extractable Material (TPH)	EPA 1664A
Oil and Grease Total Recoverable	EPA 1664A
	EPA 1664B
Organic Carbon, Total	SM 5310B-2014
	EPA 9060A
Phenols	EPA 420.4, Rev. 1.0 (1993)
Silica, Dissolved	EPA 200.7, Rev. 4.4 (1994)
	SM 4500-SiO2 C-2011
Specific Conductance	SM 2510B-2011
	EPA 9050A
Sulfide (as S)	SM 4500-S2- F-2011
	EPA 9034
Surfactant (MBAS)	SM 5540C-2011
Total Organic Halides	EPA 9020B
Turbidity	EPA 180.1, Rev. 2.0 (1993)

Nitroaromatics and Isophorone

1,3,5-Trinitrobenzene	EPA 8270E
1,3-Dinitrobenzene	EPA 8270E
1,4-Naphthoquinone	EPA 8270E
2,4-Dinitrotoluene	EPA 625.1
	EPA 8270E
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270E

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Nitroaromatics and Isophorone

4-Nitroquinoline-1-oxide	EPA 8270E
Isophorone	EPA 625.1
	EPA 8270E
Nitrobenzene	EPA 625.1
	EPA 8270E

Nitrosoamines

N-Nitrosodiethylamine	EPA 8270E
N-Nitrosodimethylamine	EPA 625.1
	EPA 8270E
N-Nitrosodi-n-butylamine	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270E
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270E
N-nitrosomethylethylamine	EPA 8270E
N-nitrosomorpholine	EPA 8270E
N-nitrosopiperidine	EPA 8270E
N-Nitrosopyrrolidine	EPA 8270E

Nutrient

Ammonia (as N)	SM 4500-NH3 H-2011
Kjeldahl Nitrogen, Total	EPA 351.2, Rev. 2.0 (1993)
Nitrate (as N)	EPA 353.2, Rev. 2.0 (1993)
Nitrate-Nitrite (as N)	EPA 353.2, Rev. 2.0 (1993)
Nitrite (as N)	SM 4500-NO2 B-2011
Orthophosphate (as P)	EPA 365.3 (Issued 1978)
Phosphorus, Total	EPA 365.3 (Issued 1978)

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Organophosphate Pesticides

Atrazine	EPA 8270E
Dimethoate	EPA 8270E
Disulfoton	EPA 8270E
Famphur	EPA 8270E
Parathion ethyl	EPA 8270E
Parathion methyl	EPA 8270E
Phorate	EPA 8270E
Thionazin	EPA 8270E

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 1633
3:3 FTCA	EPA 1633
4:2FTS	EPA 1633
5:3 FTCA	EPA 1633
6:2FTS	EPA 1633
7:3 FTCA	EPA 1633
8:2FTS	EPA 1633
9Cl-PF3ONS	EPA 1633
ADONA	EPA 1633
HFPO-DA (GenX)	EPA 1633
NEtFOSA	EPA 1633
NEtFOSAA	EPA 1633
NEtFOSE	EPA 1633
NFDHA	EPA 1633
NMeFOSA	EPA 1633
NMeFOSAA	EPA 1633
NMeFOSE	EPA 1633
Perflourotridecanoic Acid (PFTrDA)	EPA 1633

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Perfluorinated Alkyl Acids

Perfluordecanoic Acid (PFDA)	EPA 1633
Perfluoro-3-Methoxypropanoic Acid (F	EPA 1633
Perfluoro-4-Methoxybutanoic Acid (PF	EPA 1633
Perfluorobutanesulfonic Acid (PFBS)	EPA 1633
Perfluorobutanoic Acid (PFBA)	EPA 1633
Perfluorodecanesulfonic acid (PFDS)	EPA 1633
Perfluorododecanesulfonic acid (PFDc	EPA 1633
Perfluorododecanoic Acid (PFDoA)	EPA 1633
Perfluoroheptanesulfonic Acid (PFHpS	EPA 1633
Perfluoroheptanoic Acid (PFHpA)	EPA 1633
Perfluorohexanesulfonic Acid (PFHxS	EPA 1633
Perfluorohexanoic Acid (PFHxA)	EPA 1633
Perfluorononanesulfonic acid (PFNS)	EPA 1633
Perfluorononanoic Acid (PFNA)	EPA 1633
Perfluorooctanesulfonamide (PFOSA)	EPA 1633
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633
Perfluoropentanesulfonic Acid (PFPeS	EPA 1633
Perfluoropentanoic Acid (PFPeA)	EPA 1633
Perfluorotetradecanoic Acid (PFTeDA)	EPA 1633
Perfluoroundecanoic Acid (PFUnA)	EPA 1633
PFEESA	EPA 1633

Petroleum Hydrocarbons

Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D

Phthalate Esters

Benzyl butyl phthalate	EPA 625.1

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Phthalate Esters

Benzyl butyl phthalate	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270E
Diethyl phthalate	EPA 625.1
	EPA 8270E
Dimethyl phthalate	EPA 625.1
	EPA 8270E
Di-n-butyl phthalate	EPA 625.1
	EPA 8270E
Di-n-octyl phthalate	EPA 625.1
	EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3
Aroclor 1262 (PCB-1262)	EPA 8082A

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Polychlorinated Biphenyls	
Aroclor 1268 (PCB-1268)	EPA 8082A
Polynuclear Aromatics	
2-Acetylaminofluorene	EPA 8270E
3-Methylcholanthrene	EPA 8270E
7,12-Dimethylbenzyl (a) anthracene	EPA 8270E
Acenaphthene	EPA 625.1
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270E
Anthracene	EPA 625.1
	EPA 8270E
Benzo(a)anthracene	EPA 625.1
	EPA 8270E
Benzo(a)pyrene	EPA 625.1
	EPA 8270E
Benzo(b)fluoranthene	EPA 625.1
	EPA 8270E
Benzo(g,h,i)perylene	EPA 625.1
	EPA 8270E
Benzo(k)fluoranthene	EPA 625.1
	EPA 8270E
Chrysene	EPA 625.1
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 625.1
	EPA 8270E
Fluoranthene	EPA 625.1
	EPA 8270E

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Polynuclear Aromatics

Fluorene	EPA 625.1
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 625.1
	EPA 8270E
Naphthalene	EPA 625.1
	EPA 8270E
Phenanthrene	EPA 625.1
	EPA 8270E
Pyrene	EPA 625.1
	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270E
2,4,5-Trichlorophenol	EPA 625.1
	EPA 8270E
2,4,6-Trichlorophenol	EPA 625.1
	EPA 8270E
2,4-Dichlorophenol	EPA 625.1
	EPA 8270E
2,4-Dimethylphenol	EPA 625.1
	EPA 8270E
2,4-Dinitrophenol	EPA 625.1
	EPA 8270E
2,6-Dichlorophenol	EPA 8270E
2-Chlorophenol	EPA 625.1
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270E

Serial No.: 71174

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MS. OLGA AZARIAN
SGS NORTH AMERICA INC - DAYTON
2235 ROUTE 130
DAYTON, NJ 08810

NY Lab Id No: 10983

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All approved analytes are listed below:

Priority Pollutant Phenols

2-Methylphenol	EPA 625.1
	EPA 8270E
2-Nitrophenol	EPA 625.1
	EPA 8270E
3-Methylphenol	EPA 625.1
	EPA 8270E
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270E
4-Methylphenol	EPA 625.1
	EPA 8270E
4-Nitrophenol	EPA 625.1
	EPA 8270E
Pentachlorophenol	EPA 625.1
	EPA 8270E
Phenol	EPA 625.1
	EPA 8270E

Residue

Settleable Solids	SM 2540 F-2015
Solids, Total	SM 2540 B-2015
Solids, Total Dissolved	SM 2540 C-2015
Solids, Total Suspended	SM 2540 D-2015
Solids, Volatile	EPA 160.4 (Issued 1971)

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270E

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Semi-Volatile Organics

1,4-Dichlorobenzene, Semi-volatile	EPA 8270E
2-Methylnaphthalene	EPA 8270E
2-Picoline	EPA 8270E
4-Amino biphenyl	EPA 8270E
Acetophenone	EPA 625.1
	EPA 8270E
alpha-Terpineol	EPA 625.1
Aramite	EPA 8270E
Benzaldehyde	EPA 8270E
Benzoic Acid	EPA 8270E
Benzyl alcohol	EPA 8270E
Caprolactam	EPA 8270E
Dibenzofuran	EPA 8270E
Ethyl methanesulfonate	EPA 8270E
Isosafrole	EPA 8270E
Methyl methanesulfonate	EPA 8270E
n-Decane	EPA 625.1
n-Octadecane	EPA 625.1
O,O,O-Triethyl phosphorothioate	EPA 8270E
p-Dimethylaminoazobenzene	EPA 8270E
Phenacetin	EPA 8270E
Safrole	EPA 8270E

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
1,2,4-Trimethylbenzene	EPA 8260D
1,2-Dichlorobenzene	EPA 8260D
	EPA 624.1

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Volatile Aromatics

1,3,5-Trimethylbenzene	EPA 8260D
1,3-Dichlorobenzene	EPA 8260D
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260D
	EPA 624.1
2-Chlorotoluene	EPA 8260D
4-Chlorotoluene	EPA 8260D
Benzene	EPA 8260D
	EPA 624.1
Bromobenzene	EPA 8260D
Chlorobenzene	EPA 8260D
	EPA 624.1
Ethyl benzene	EPA 8260D
	EPA 624.1
Isopropylbenzene	EPA 8260D
m/p-Xylenes	EPA 8260D
	EPA 624.1
Naphthalene, Volatile	EPA 8260D
n-Butylbenzene	EPA 8260D
n-Propylbenzene	EPA 8260D
o-Xylene	EPA 8260D
	EPA 624.1
p-Isopropyltoluene (P-Cymene)	EPA 8260D
sec-Butylbenzene	EPA 8260D
Styrene	EPA 8260D
	EPA 624.1
tert-Butylbenzene	EPA 8260D

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Volatile Aromatics	
Toluene	EPA 8260D
	EPA 624.1
Total Xylenes	EPA 8260D
	EPA 624.1
Volatile Chlorinated Organics	
Benzyl chloride	EPA 8260D
Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260D
1,1,1-Trichloroethane	EPA 8260D
	EPA 624.1
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 624.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 624.1
1,1,2-Trichloroethane	EPA 8260D
	EPA 624.1
1,1-Dichloroethane	EPA 8260D
	EPA 624.1
1,1-Dichloroethene	EPA 8260D
	EPA 624.1
1,1-Dichloropropene	EPA 8260D
1,2,3-Trichloropropane	EPA 8260D
1,2-Dibromo-3-chloropropane	EPA 8260D
1,2-Dibromoethane	EPA 8260D
1,2-Dichloroethane	EPA 8260D
	EPA 624.1

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Volatile Halocarbons

1,2-Dichloropropane	EPA 8260D
	EPA 624.1
1,3-Dichloropropane	EPA 8260D
2,2-Dichloropropane	EPA 8260D
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260D
2-Chloroethylvinyl ether	EPA 8260D
	EPA 624.1
3-Chloropropene (Allyl chloride)	EPA 8260D
Bromochloromethane	EPA 8260D
Bromodichloromethane	EPA 8260D
	EPA 624.1
Bromoform	EPA 8260D
	EPA 624.1
Bromomethane	EPA 8260D
	EPA 624.1
Carbon tetrachloride	EPA 8260D
	EPA 624.1
Chloroethane	EPA 8260D
	EPA 624.1
Chloroform	EPA 8260D
	EPA 624.1
Chloromethane	EPA 8260D
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260D
	EPA 624.1
cis-1,3-Dichloropropene	EPA 8260D
	EPA 624.1

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Volatile Halocarbons

Dibromochloromethane	EPA 8260D
	EPA 624.1
Dibromomethane	EPA 8260D
Dichlorodifluoromethane	EPA 8260D
	EPA 624.1
Hexachlorobutadiene, Volatile	EPA 8260D
Methyl iodide	EPA 8260D
Methylene chloride	EPA 8260D
	EPA 624.1
Tetrachloroethene	EPA 8260D
	EPA 624.1
trans-1,2-Dichloroethene	EPA 8260D
	EPA 624.1
trans-1,3-Dichloropropene	EPA 8260D
	EPA 624.1
trans-1,4-Dichloro-2-butene	EPA 8260D
Trichloroethene	EPA 8260D
	EPA 624.1
Trichlorofluoromethane	EPA 8260D
	EPA 624.1
Vinyl chloride	EPA 8260D
	EPA 624.1

Volatiles Organics

1,4-Dioxane	EPA 8260D
	EPA 8260D SIM
	EPA 8270E
	EPA 8270E SIM

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Volatiles Organics

2-Butanone (Methylethyl ketone)	EPA 8260D
2-Hexanone	EPA 8260D
2-Nitropropane	EPA 8260D
4-Methyl-2-Pentanone	EPA 8260D
Acetone	EPA 8260D
	EPA 624.1
Acetonitrile	EPA 8260D
Carbon Disulfide	EPA 8260D
Cyclohexane	EPA 8260D
Di-ethyl ether	EPA 8260D
Ethyl Acetate	EPA 8260D
Isobutyl alcohol	EPA 8260D
	EPA 8015D
Methanol	EPA 8015D
Methyl acetate	EPA 8260D
Methyl cyclohexane	EPA 8260D
n-Butanol	EPA 8260D
o-Toluidine	EPA 8270E
Tetrahydrofuran	EPA 8260D
	EPA 624.1
Vinyl acetate	EPA 8260D
	EPA 624.1

Sample Preparation Methods

	EPA 5030C
	SM 4500-CN B-2016 and C-2016
	EPA 3511
	EPA 3010A

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All approved analytes are listed below:

Sample Preparation Methods

EPA 3005A

EPA 3510C

EPA 3520C

SM 4500-NH3 B-2011

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

Perfluorooctanoic Acid (PFOA)	EPA 1633

Serial No.: 71175

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All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260D
Acrylonitrile	EPA 8260D
Ethyl methacrylate	EPA 8260D
Methyl acrylonitrile	EPA 8260D
Methyl methacrylate	EPA 8260D

Amines

1,2-Diphenylhydrazine	EPA 8270E
1,4-Phenylenediamine	EPA 8270E
1-Naphthylamine	EPA 8270E
2-Naphthylamine	EPA 8270E
2-Nitroaniline	EPA 8270E
3-Nitroaniline	EPA 8270E
4-Chloroaniline	EPA 8270E
4-Nitroaniline	EPA 8270E
5-Nitro-o-toluidine	EPA 8270E
a,a-Dimethylphenethylamine	EPA 8270E
Aniline	EPA 8270E
Carbazole	EPA 8270E
Diphenylamine	EPA 8270E
Methapyrilene	EPA 8270E
Pronamide	EPA 8270E

Benzidines

3,3'-Dichlorobenzidine	EPA 8270E
Benzidine	EPA 8270E

Characteristic Testing

Corrosivity (pH)	EPA 9045D

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Characteristic Testing

Free Liquids	EPA 9095B
Ignitability	EPA 1010B
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B
4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
Atrazine	EPA 8270E
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
Chlorobenzilate	EPA 8270E
delta-BHC	EPA 8081B
Diallate	EPA 8270E
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B

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Chlorinated Hydrocarbon Pesticides

Isodrin	EPA 8270E
Kepone	EPA 8270E
Lindane	EPA 8081B
Methoxychlor	EPA 8081B
Mirex	EPA 8081B
Pentachloronitrobenzene	EPA 8270E
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
1,2,4,5-Tetrachlorobenzene	EPA 8270E
1,2,4-Trichlorobenzene	EPA 8270E
2-Chloronaphthalene	EPA 8270E
Hexachlorobenzene	EPA 8270E
Hexachlorobutadiene	EPA 8270E
Hexachlorocyclopentadiene	EPA 8270E
Hexachloroethane	EPA 8260D
	EPA 8270E
Hexachloropropene	EPA 8270E
Pentachlorobenzene	EPA 8270E

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
2,4-DB	EPA 8151A
Dalapon	EPA 8151A
Dicamba	EPA 8151A

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Chlorophenoxy Acid Pesticides

Dichloroprop	EPA 8151A
Dinoseb	EPA 8151A
	EPA 8270E
MCPA	EPA 8151A
MCPP	EPA 8151A
Pentachlorophenol	EPA 8151A

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270E
4-Bromophenylphenyl ether	EPA 8270E
4-Chlorophenylphenyl ether	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 8270E
Bis(2-chloroethyl)ether	EPA 8270E

Low Level Polynuclear Aromatic Hydrocarbons

Acenaphthene Low Level	EPA 8270E SIM
Acenaphthylene Low Level	EPA 8270E SIM
Anthracene Low Level	EPA 8270E SIM
Benzo(a)anthracene Low Level	EPA 8270E SIM
Benzo(a)pyrene Low Level	EPA 8270E SIM
Benzo(b)fluoranthene Low Level	EPA 8270E SIM
Benzo(g,h,i)perylene Low Level	EPA 8270E SIM
Benzo(k)fluoranthene Low Level	EPA 8270E SIM
Chrysene Low Level	EPA 8270E SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270E SIM
Fluoranthene Low Level	EPA 8270E SIM
Fluorene Low Level	EPA 8270E SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270E SIM

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Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. OLGA AZARIAN
SGS NORTH AMERICA INC - DAYTON
2235 ROUTE 130
DAYTON, NJ 08810

NY Lab Id No: 10983

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Low Level Polynuclear Aromatic Hydrocarbons

Naphthalene Low Level	EPA 8270E SIM
Phenanthrene Low Level	EPA 8270E SIM
Pyrene Low Level	EPA 8270E SIM

Metals I

Barium, Total	EPA 6010D
	EPA 6020B
Cadmium, Total	EPA 6010D
	EPA 6020B
Calcium, Total	EPA 6010D
	EPA 6020B
Chromium, Total	EPA 6010D
	EPA 6020B
Copper, Total	EPA 6010D
	EPA 6020B
Iron, Total	EPA 6010D
	EPA 6020B
Lead, Total	EPA 6010D
	EPA 6020B
Magnesium, Total	EPA 6010D
	EPA 6020B
Manganese, Total	EPA 6010D
	EPA 6020B
Nickel, Total	EPA 6010D
	EPA 6020B
Potassium, Total	EPA 6010D
	EPA 6020B
Silver, Total	EPA 6010D

Serial No.: 71176

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WADSWORTH CENTER

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Metals I

Silver, Total	EPA 6020B
Sodium, Total	EPA 6010D
	EPA 6020B
Strontium, Total	EPA 6010D
	EPA 6020B

Metals II

Aluminum, Total	EPA 6010D
	EPA 6020B
Antimony, Total	EPA 6010D
	EPA 6020B
Arsenic, Total	EPA 6010D
	EPA 6020B
Beryllium, Total	EPA 6010D
	EPA 6020B
Chromium VI	EPA 7196A
	EPA 7199
Mercury, Total	EPA 7471B
Selenium, Total	EPA 6010D
	EPA 6020B
Vanadium, Total	EPA 6010D
	EPA 6020B
Zinc, Total	EPA 6010D
	EPA 6020B

Metals III

Cobalt, Total	EPA 6010D
	EPA 6020B

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Metals III

Molybdenum, Total	EPA 6010D
	EPA 6020B
Thallium, Total	EPA 6010D
	EPA 6020B
Tin, Total	EPA 6010D
	EPA 6020B
Titanium, Total	EPA 6010D
	EPA 6020B

Minerals

Bromide	EPA 9056A
Chloride	EPA 9056A
Fluoride, Total	EPA 9056A
Sulfate (as SO4)	EPA 9056A

Miscellaneous

Boron, Total	EPA 6010D
Cyanide, Total	EPA 9012B
Extractable Organic Halides	EPA 9023
Organic Carbon, Total	Lloyd Kahn Method
	EPA 9060A
Sulfide (as S)	EPA 9034

Nitroaromatics and Isophorone

1,3,5-Trinitrobenzene	EPA 8270E
1,3-Dinitrobenzene	EPA 8270E
1,4-Naphthoquinone	EPA 8270E
2,4-Dinitrotoluene	EPA 8270E
2,6-Dinitrotoluene	EPA 8270E

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Nitroaromatics and Isophorone

4-Dimethylaminoazobenzene	EPA 8270E
4-Nitroquinoline-1-oxide	EPA 8270E
Hydroquinone	EPA 8270E
Isophorone	EPA 8270E
Nitrobenzene	EPA 8270E
Pyridine	EPA 8270E

Nitrosoamines

N-Nitrosodiethylamine	EPA 8270E
N-Nitrosodimethylamine	EPA 8270E
N-Nitrosodi-n-butylamine	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270E
N-nitrosomethylethylamine	EPA 8270E
N-nitrosomorpholine	EPA 8270E
N-nitrosopiperidine	EPA 8270E
N-Nitrosopyrrolidine	EPA 8270E

Organophosphate Pesticides

Dimethoate	EPA 8270E
Disulfoton	EPA 8270E
Famphur	EPA 8270E
Parathion ethyl	EPA 8270E
Parathion methyl	EPA 8270E
Phorate	EPA 8270E
Thionazin	EPA 8270E

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 1633

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Perfluorinated Alkyl Acids

3:3 FTCA	EPA 1633
4:2FTS	EPA 1633
5:3 FTCA	EPA 1633
6:2FTS	EPA 1633
7:3 FTCA	EPA 1633
8:2FTS	EPA 1633
9Cl-PF3ONS	EPA 1633
ADONA	EPA 1633
HFPO-DA (GenX)	EPA 1633
NEtFOSA	EPA 1633
NEtFOSAA	EPA 1633
NEtFOSE	EPA 1633
NFDHA	EPA 1633
NMeFOSA	EPA 1633
NMeFOSAA	EPA 1633
NMeFOSE	EPA 1633
Perflourotridecanoic Acid (PFTrDA)	EPA 1633
Perfluordecanoic Acid (PFDA)	EPA 1633
Perfluoro-3-Methoxypropanoic Acid (P	EPA 1633
Perfluoro-4-Methoxybutanoic Acid (PF	EPA 1633
Perfluorobutanesulfonic Acid (PFBS)	EPA 1633
Perfluorobutanoic Acid (PFBA)	EPA 1633
Perfluorodecanesulfonic acid (PFDS)	EPA 1633
Perfluorododecanesulfonic acid (PFDc	EPA 1633
Perfluorododecanoic Acid (PFDoA)	EPA 1633
Perfluoroheptanesulfonic Acid (PFHpS	EPA 1633
Perfluoroheptanoic Acid (PFHpA)	EPA 1633

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Perfluorinated Alkyl Acids

Perfluorohexanesulfonic Acid (PFHxS	EPA 1633
Perfluorohexanoic Acid (PFHxA)	EPA 1633
Perfluorononanesulfonic acid (PFNS)	EPA 1633
Perfluorononanoic Acid (PFNA)	EPA 1633
Perfluorooctanesulfonamide (PFOSA)	EPA 1633
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633
Perfluorooctanoic Acid (PFOA)	EPA 1633
Perfluoropentanesulfonic Acid (PFPeS	EPA 1633
Perfluoropentanoic Acid (PFPeA)	EPA 1633
Perfluorotetradecanoic Acid (PFTeDA)	EPA 1633
Perfluoroundecanoic Acid (PFUnA)	EPA 1633
PFEESA	EPA 1633

Petroleum Hydrocarbons

Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Oil and Grease Total Recoverable	EPA 9071B (Solvent:Hexane)

Phthalate Esters

Benzyl butyl phthalate	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 8270E
Diethyl phthalate	EPA 8270E
Dimethyl phthalate	EPA 8270E
Di-n-butyl phthalate	EPA 8270E
Di-n-octyl phthalate	EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1016 (PCB-1016) in Oil	EPA 8082A

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Polychlorinated Biphenyls

Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1221 (PCB-1221) in Oil	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1232 (PCB-1232) in Oil	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1242 (PCB-1242) in Oil	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1248 (PCB-1248) in Oil	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1254 (PCB-1254) in Oil	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1260 (PCB-1260) in Oil	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1262 (PCB-1262) in Oil	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Aroclor 1268 (PCB-1268) in Oil	EPA 8082A

Polynuclear Aromatic Hydrocarbons

2-Acetylaminofluorene	EPA 8270E
3-Methylcholanthrene	EPA 8270E
7,12-Dimethylbenzyl (a) anthracene	EPA 8270E
Acenaphthene	EPA 8270E
Acenaphthylene	EPA 8270E
Anthracene	EPA 8270E
Benzo(a)anthracene	EPA 8270E
Benzo(a)pyrene	EPA 8270E
Benzo(b)fluoranthene	EPA 8270E
Benzo(g,h,i)perylene	EPA 8270E

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Polynuclear Aromatic Hydrocarbons

Benzo(k)fluoranthene	EPA 8270E
Chrysene	EPA 8270E
Dibenzo(a,h)anthracene	EPA 8270E
Fluoranthene	EPA 8270E
Fluorene	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 8270E
Naphthalene	EPA 8270E
Phenanthrene	EPA 8270E
Pyrene	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270E
2,4,5-Trichlorophenol	EPA 8270E
2,4,6-Trichlorophenol	EPA 8270E
2,4-Dichlorophenol	EPA 8270E
2,4-Dimethylphenol	EPA 8270E
2,4-Dinitrophenol	EPA 8270E
2,6-Dichlorophenol	EPA 8270E
2-Chlorophenol	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 8270E
2-Methylphenol	EPA 8270E
2-Nitrophenol	EPA 8270E
3-Methylphenol	EPA 8270E
4-Chloro-3-methylphenol	EPA 8270E
4-Methylphenol	EPA 8270E
4-Nitrophenol	EPA 8270E
Pentachlorophenol	EPA 8270E
Phenol	EPA 8270E

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Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270E
2-Methylnaphthalene	EPA 8270E
2-Picoline	EPA 8270E
4-Amino biphenyl	EPA 8270E
Acetophenone	EPA 8270E
Aramite	EPA 8270E
Benzaldehyde	EPA 8270E
Benzoic Acid	EPA 8270E
Benzyl alcohol	EPA 8270E
Caprolactam	EPA 8270E
Dibenzofuran	EPA 8270E
Ethyl methanesulfonate	EPA 8270E
Isosafrole	EPA 8270E
Methyl methanesulfonate	EPA 8270E
O,O,O-Triethyl phosphorothioate	EPA 8270E
Phenacetin	EPA 8270E
Safrole	EPA 8270E

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
1,2,4-Trimethylbenzene	EPA 8260D
1,2-Dichlorobenzene	EPA 8260D
1,3,5-Trimethylbenzene	EPA 8260D
1,3-Dichlorobenzene	EPA 8260D
1,4-Dichlorobenzene	EPA 8260D

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Volatile Aromatics

2-Chlorotoluene	EPA 8260D
4-Chlorotoluene	EPA 8260D
Benzene	EPA 8260D
Bromobenzene	EPA 8260D
Chlorobenzene	EPA 8260D
Ethyl benzene	EPA 8260D
Isopropylbenzene	EPA 8260D
m/p-Xylenes	EPA 8260D
Naphthalene, Volatile	EPA 8260D
n-Butylbenzene	EPA 8260D
n-Propylbenzene	EPA 8260D
o-Xylene	EPA 8260D
p-Isopropyltoluene (P-Cymene)	EPA 8260D
sec-Butylbenzene	EPA 8260D
Styrene	EPA 8260D
tert-Butylbenzene	EPA 8260D
Toluene	EPA 8260D
Total Xylenes	EPA 8260D

Volatile Chlorinated Organics

Benzyl chloride	EPA 8260D

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
1,1,1-Trichloroethane	EPA 8260D
1,1,2,2-Tetrachloroethane	EPA 8260D
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
1,1,2-Trichloroethane	EPA 8260D

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Volatile Halocarbons

1,1-Dichloroethane	EPA 8260D
1,1-Dichloroethene	EPA 8260D
1,1-Dichloropropene	EPA 8260D
1,2,3-Trichloropropane	EPA 8260D
1,2-Dibromo-3-chloropropane	EPA 8260D
1,2-Dibromoethane	EPA 8260D
1,2-Dichloroethane	EPA 8260D
1,2-Dichloropropane	EPA 8260D
1,3-Dichloropropane	EPA 8260D
2,2-Dichloropropane	EPA 8260D
2-Chloro-1,3-butadiene (Chloroprene)	EPA 8260D
2-Chloroethylvinyl ether	EPA 8260D
3-Chloropropene (Allyl chloride)	EPA 8260D
Bromochloromethane	EPA 8260D
Bromodichloromethane	EPA 8260D
Bromoform	EPA 8260D
Bromomethane	EPA 8260D
Carbon tetrachloride	EPA 8260D
Chloroethane	EPA 8260D
Chloroform	EPA 8260D
Chloromethane	EPA 8260D
cis-1,2-Dichloroethene	EPA 8260D
cis-1,3-Dichloropropene	EPA 8260D
Dibromochloromethane	EPA 8260D
Dibromomethane	EPA 8260D
Dichlorodifluoromethane	EPA 8260D
Hexachlorobutadiene, Volatile	EPA 8260D

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Volatile Halocarbons

Methyl iodide	EPA 8260D
Methylene chloride	EPA 8260D
Tetrachloroethene	EPA 8260D
trans-1,2-Dichloroethene	EPA 8260D
trans-1,3-Dichloropropene	EPA 8260D
trans-1,4-Dichloro-2-butene	EPA 8260D
Trichloroethene	EPA 8260D
Trichlorofluoromethane	EPA 8260D
Vinyl chloride	EPA 8260D

Volatile Organics

1,4-Dioxane	EPA 8260D
	EPA 8260D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
2-Hexanone	EPA 8260D
2-Nitropropane	EPA 8260D
4-Methyl-2-Pentanone	EPA 8260D
Acetone	EPA 8260D
Acetonitrile	EPA 8260D
Carbon Disulfide	EPA 8260D
Cyclohexane	EPA 8260D
Di-ethyl ether	EPA 8260D
Ethyl Acetate	EPA 8260D
Isobutyl alcohol	EPA 8260D
	EPA 8015D
Methyl acetate	EPA 8260D

Serial No.: 71176

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised July 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. OLGA AZARIAN
SGS NORTH AMERICA INC - DAYTON
2235 ROUTE 130
DAYTON, NJ 08810

NY Lab Id No: 10983

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Organics

Methyl cyclohexane	EPA 8260D
Methyl tert-butyl ether	EPA 8260D
n-Butanol	EPA 8260D
o-Toluidine	EPA 8270E
Propionitrile	EPA 8260D
tert-butyl alcohol	EPA 8260D
	EPA 8015D
Tetrahydrofuran	EPA 8260D
Vinyl acetate	EPA 8260D

Sample Preparation Methods

EPA 5035A-L
EPA 5035A-H
EPA 3570
EPA 3580A
EPA 3050B
EPA 3550C
EPA 3540C
EPA 3546
EPA 3051A
EPA 3060A

Serial No.: 71176

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APPENDIX B

Health and Safety Plan

Universal Health & Safety Plan

Town of Hurley Landfill

1043 Dug Hill Rd
West Hurley, NY 12491
U.S.A.

Prepared For:

Client Name:	New York State Department of Environmental Conservation
Client Address:	625 Broadway Albany, NY 12233
Project #:	60762183

Prepared By:

AECOM
40 British American Blvd
Latham, NY 12110

Preparer:

Name: Ray Heller
Title: Environmental Engineer I
Date Prepared: July 8, 2025

Signature

Reviewer *(Office SHER; Area/Regional SHEM, or Business Line SHEM)*

Name: Caroline Lee
Title: EBL SH&E Manager
Date Reviewed: July 28, 2025

Signature

Approver: *(Project Manager, Project Director, or BL Lead)*

Name: Abdiel Lopez Torres
Title: Project Manager
Date Approved: August 5, 2025

Signature

Expiration:	**August 5, 2026**	Valid for one (1) year maximum or until the scope of work, subcontractor(s), methods and/or equipment change.

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Attachment C: Stretch/Flex Poster
Attachment D: Site Safety Orientation
Attachment E: Work Plan/Client and Host Facility SH&E Requirements
Attachment F-1: Project Hazardous Materials Communication Plan
Attachment F-2: Safety Data Sheets

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1. HASP Summary Contact Information

SH&E Incident Reporting	**SH&E Incident Hotline: 1-800-348-5046** TOLL-FREE | 24 HOURS PER DAY | 7 DAYS PER WEEK | Immediately report all incidents including any potential work-related injuries, illnesses, discomfort/pain, property damage, security issues, regulatory inspections, and environmental impacts/spills.

	Nearest Resource	Name and Address	Hours of Operation	Phone #
Medical Treatment Resources	**Clinic**	Emergency One 40 Hurley Ave, Kingston, NY 12401	8AM-8PM 7 days/week	(845) 338-5600
	Hospital	HealthAlliance Hospital 105 Marys Ave, Kingston, NY 12401	24/7	(845) 338-2500
	First Aid Providers	Abdiel Lopez Torres		518-951-2393
		Enter Names of First Aid Providers		M: XXX-XXX-XXXX
	Nurse	**1-512-419-5016** – 24 HOURS PER DAY | 7 DAYS PER WEEK The hotline Operator will transfer injured/ill EE to nurse. If the transfer fails or EE's condition worsens following initial consultation, call direct.		
	Site Emergency Response	**911 (Or enter site specific appropriate number when applicable)**		

	Level	Title	Name	Phone #
Key Personnel	**Project Level**	**Project Manager (PM):**	Abdiel Lopez Torres	518-951-2393
		Site Supervisor (SS):	Chris French	518-951-2204
		Site Safety Lead (SSL):	Chris French	518-951-2204
		Client Contact Person:	Michael Boms	845-331-7474
		Account SH&E Manager:		
		Area/Business Line SH&E Manager:	Caroline Lee	610-234-0407
		Regional SH&E Director:	Tony Indorato	757-298-1563

List ALL Short-Service Employees (<6 Months with AECOM or in Current Area/Job Description):

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	SSE's Name	SSE's Phone Number	Mentor's Name	Mentor's Phone #
SSEs	NA	NA	NA	NA
	NA	NA	NA	NA

Other Important Numbers	**Poison Control**	American Association of Poison Control Centers	800-222-1222
	D&A Testing	AECOM Occupational Nurse **AECOM D&A Program Administrator**	512-419-5016
	INFOR TRAC	AECOM Account Number: 74984	800-535-5053
	HOLMAN	AECOM Fleet Management	800-227-2273

Does the project require a Site Safety Lead? ☒ YES ☐ NO

AECOM Site Safety Lead (SSL) requirements apply if the answer is "yes" to both questions below:

- *Is the employee directly tasked with supervising safety implementation on a program/project?*
- *Does the project/program activities include one or more high hazards (see below)?*

Notes:

- *SSL needs to be approved through the SSL/SSHO Platform for the works to be performed – Click here for more information.*
- *An SSL can hold additional roles. The SH&E Manager approving this plan will assess the need for a fully dedicated SSL.*

☒ Site Safety Lead is approved (through the SSL Platform), and the PM acknowledges SSL is/are qualified and authorizes the SSL to monitor/supervise the following **High hazards**:

☐ Confined Spaces	☐ Hazardous Energy Control	☐ Underground Work
☐ Hazardous Substances / Respiratory Protection	☒ Heavy Equipment-Machines	☐ Working at Height
☒ Ground Disturbance	☐ Highway and Road Work	☐ Work On, In and Near Water
☒ Hand and Power Tools	☐ Railroad	☐ Radiological Hazards
☐ Other:		

SSL Variance required: ☐ YES ☒ NO

Explain the reasons for the variance:

Contractual Requirements for Safety, Health, and the Environment

☒ I have reviewed the AECOM Contract with our client and described our contractual duties for SH&E Below.

Abdiel Lopez Torres _____ Click to enter select DATE

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Project Manager Name	Project Manager Signature	Date

☒ AECOM is responsible for our own safety and that of our subcontractors.

☐ AECOM will be on-site with a General Contractor or other party who is responsible for their own safety. AECOM must comply with their safety plan in addition to our own plan; AECOM remains responsible for our safety and that of our subcontractors.

☐ AECOM has some level of safety responsibility for a General Contractor or other party (includes responsibility for reporting safety hazards, reviewing site controls etc.; describe below).

☐ Other/Additional Details: N/A

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2. Introduction

This written Health and Safety Plan (HASP) is designed to identify, evaluate, and control safety and health hazards, and to outline emergency response actions for AECOM-managed activities. This HASP must be kept on site during work activities and made available to all workers including subcontractors and other site occupants for informational purposes. AECOM subcontractors are expected to independently characterize, assess, and control site hazards created by their specific scope of work.

This section of the HASP summarizes important AECOM SH&E Procedures that apply to all DCS Americas jobs. See **Attachment A** for the project Task Hazard Assessment (THA) forms and **Attachment B** for a list of applicable field SH&E Procedures. These field SH&E procedures must be readily available to the field employees (i.e. PDF, electronically, etc.).

2.1 Applicable References

This HASP conforms to the regulatory requirements and guidelines established in the following documents:

- Federal Occupational Safety and Health Administration (OSHA) Code of Federal Regulation Title 29, Part 1910 (29 CFR Part 1910), Safety and Health Regulations for General Industry and 29 CFR 1926, Safety and Health Regulations for Construction.
- National Institute for Occupational Safety and Health/Occupational Safety and Hazards Administration/U.S. Coast Guard/U.S. Environmental Protection Agency, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.
- The requirements in this HASP also conform to AECOM's Safety for Life Program requirements as specified in the AECOM Global Safety, Health, and Environment (SH&E) System Management Manual.

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3. Verbal Incident Notifications

NOTE! In the event of a life-threatening emergency, call 911 FIRST. A life-threatening emergency can include:

- Loss of consciousness
- Head or spinal cord injury
- Cardiac arrest
- Seizures
- Severe allergic reaction
- Broken bones
- Uncontrolled loss of blood
- Abdominal trauma
- Heat Stroke
- Difficulty breathing

3.1 Incidents

Once immediate actions have been taken, if safe to do so, notifications (verbal) must be completed immediately and the involved employee, site supervisor or site safety lead must call the **AECOM Incident Reporting Hotline** at **1-800-348-5046**. Notifications serve to engage additional resources in the management of the emergency and initiate additional processes such as medical case management, spill response, incident investigation, etc. Reporting initiates the formal documentation process and supports the development of key learnings to prevent a reoccurrence. No employee is authorized to report incidents to regulatory agencies. Only Senior members of the Health & Safety team are authorized to conduct regulatory reporting (i.e. Vice President).

Any incident for which assistance by SHE is required, including any injury – *even if no first aid is required* – must be immediately communicated to their manager or supervisor and the Incident Hotline at 1-800-348-5046. All incidents are also to be reported to IndustrySafe within 4 hours for significant incidents, or 24 hours for all other incidents.

Significant Incident:

- Fatality;
- Amputation;
- Hospitalization for treatment for more than 24 hours (admission);
- Any single event resulting in more than one employee requiring medical treatment or being away from work more than 3 days;
- Any SHE-related Consent Agreement/Order/Lawsuit or enforcement action seeking more than $10,000 or alleging criminal activity;
- Any spill or release of a hazardous material that is reportable to a regulatory agency;
- Any Notices of Violation resulting from not operating within a regulatory agency permit/license or consent;
- Any incident resulting in property damage expected to exceed $10,000 United States (US) dollars;
- Any security-related incident that could have caused significant harm to an AECOM employee; and/or
- Any Near Miss that may have resulted in any of the above, but because of “luck” did not happen.

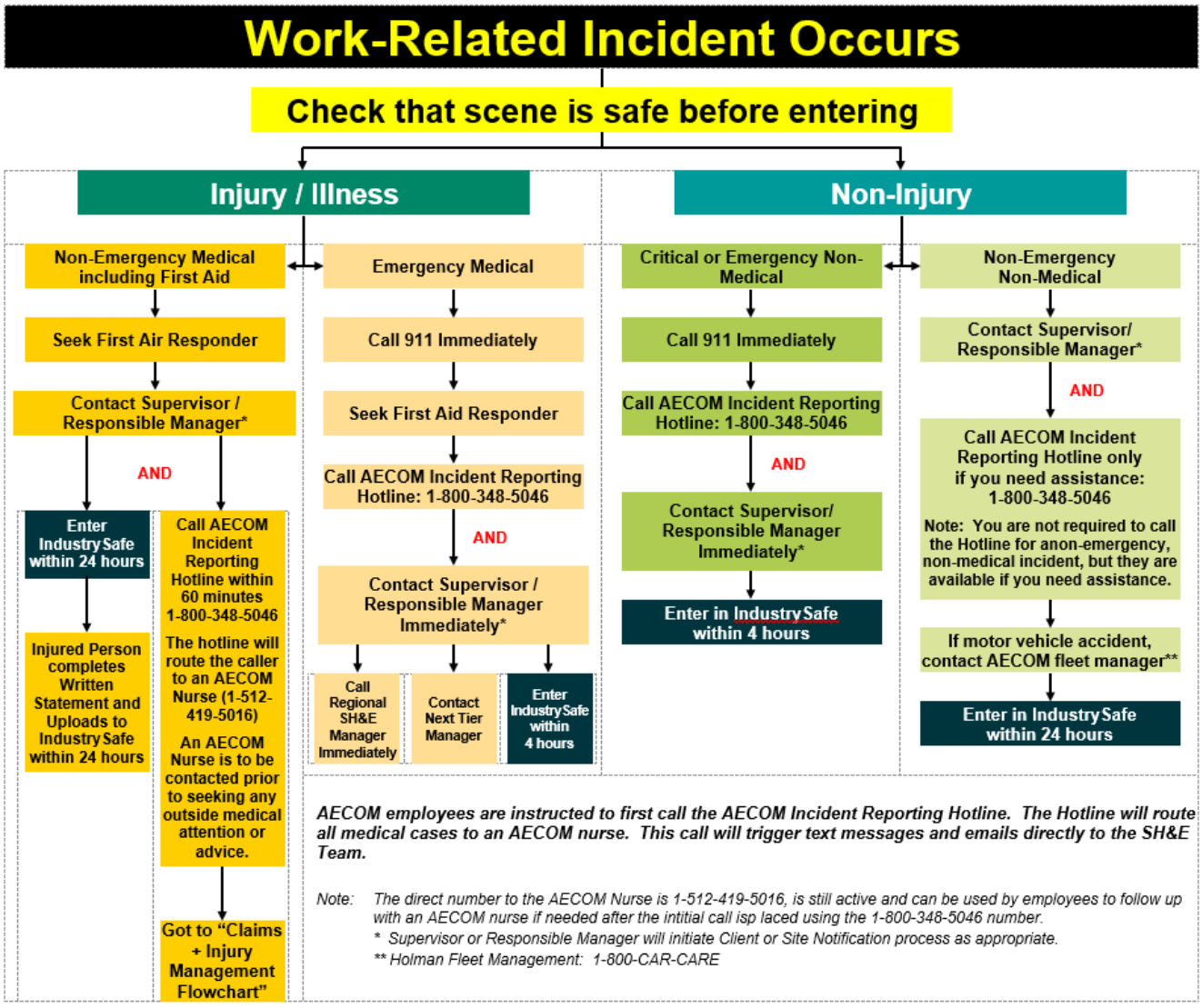
All Other Incidents:

- Any injury or illness to an AECOM employee or subcontractor, even if it does not require medical attention, including work-related injuries/illnesses that have become significantly aggravated by the work environment;
- An injury to a member of the public, or clients, occurring on an AECOM-controlled work site;
- Re-occurring conditions such as back pain or cumulative trauma disorders (e.g., carpal tunnel syndrome);
- Fire, explosion, or flash that is not an intended result of a planned event (e.g., remediation process, laboratory procedure);
- Any incident involving company-owned, rented, or leased vehicles (including personal vehicles used for company business); and/or

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- Any failure to comply with the requirements of a regulatory permit issued to AECOM.

Table 3-1: Incident Notification & Reporting Flow Chart



3.2 AECOM Internal Notifications

For any incident or near miss, the involved employee must notify their site supervisor or site safety office. The site supervisor or site safety lead must notify their Project Manager. Depending on the severity of the incident, the Project Manager may need to notify the following individuals:

- Regional, area, business line, practice group or account SH&E manager.
- Program Manager or Client Account Manager
- Senior Leaders

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3.3 Client Specific Notifications

Project Manager and or Client Account Manager complete client specific notifications of incidents in accordance with client's incident notification requirements. See client contact information in the Key Personnel table at the bottom of the **Section 1** on Page 1.

4. Emergency Response Plan

AECOM requires that all projects, plan for reasonably foreseeable emergencies. Prior to the start of site mobilization, all AECOM personnel shall review the site-specific information regarding evacuations, muster points, communication, emergency equipment and its location, and other site-specific emergency procedures.

Subcontractors will not use AECOM Hotline # and may use a different clinic based on their own Emergency Protocols. They will provide their own Project Emergency Plan to AECOM for review and acceptance. Any alterations to this plan must be communicated to all parties. Both AECOM and the subcontractor shall perform mock drills periodically in accordance with the length of the project.

4.1 Directions and Maps to Nearest Medical Treatment Resources

See following pages for directions and maps.

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NEAREST HOSPITAL

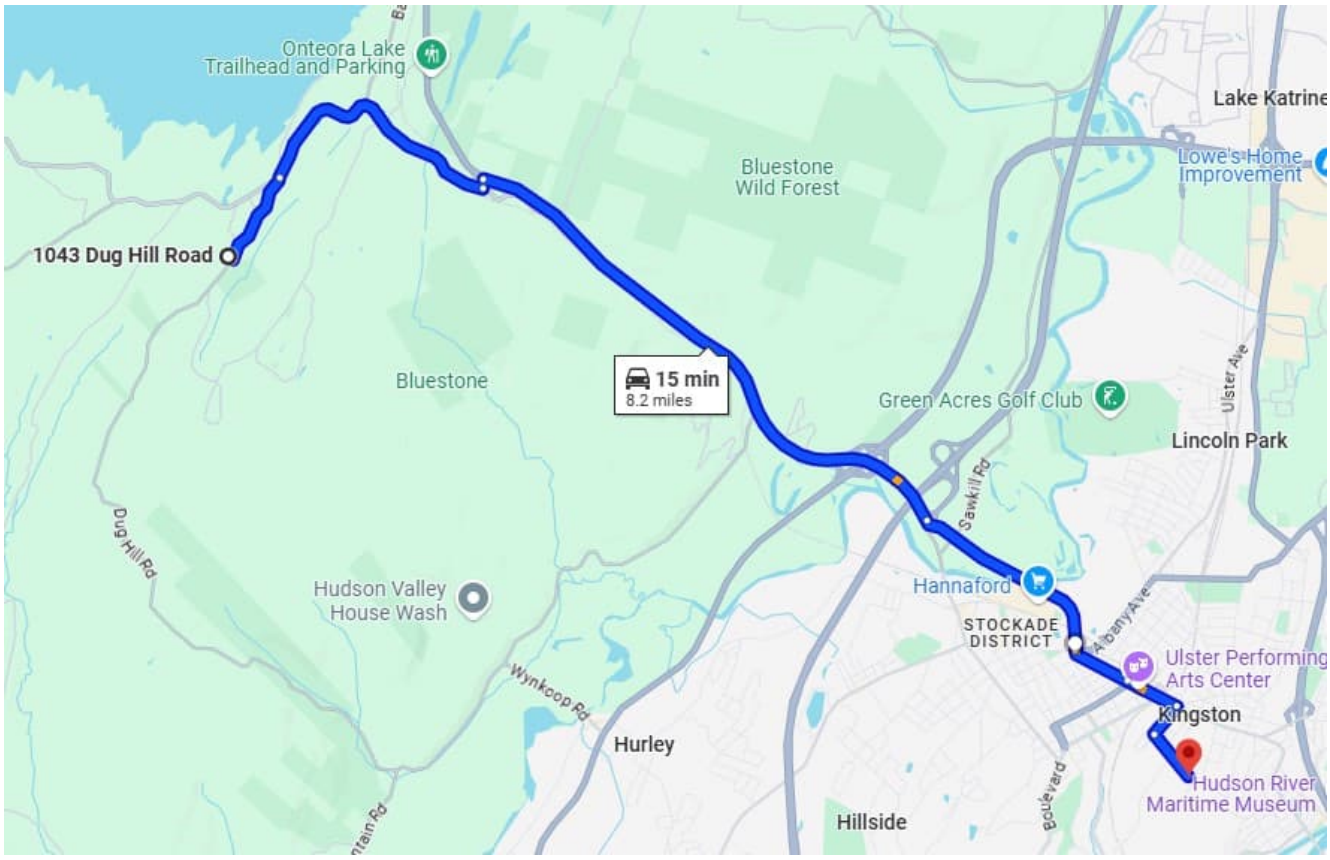
HealthAlliance Hospital **(845) 338-2500**

Address:	105 Marys Ave, Kingston, NY 12401		
Hours of Operation:	24/7		
Travel Time:	15 Minutes	**Travel Distance:**	8.2 Miles

DRIVING DIRECTIONS TO HOSPITAL

1. From Site, turn left onto Dug Hill Rd. and head northeast for 0.6 miles.
2. Turn right onto NY-28A E and head east for 1.7 miles.
3. Turn left onto Waughkonk Rd. and head north for 308 feet.
4. Turn right onto NY-28 E and head southeast for 3.5 miles.
5. At the traffic circle, take the 2nd exit onto I-587 E and head southeast for 1.2 miles.
6. Keep left to continue on Col Chandler Dr. and head south for 217 feet.
7. At the traffic circle, take the 2nd exit onto Broadway and head southeast for 0.7 miles.
8. Turn right onto Pine Grove Ave. and head southwest for 0.2 miles.
9. Turn left onto Marys Ave. and head southeast for 0.3 miles.
10. Arrive at hospital on the right.

ROUTE MAP TO HOSPITAL



NEAREST OCCUPATIONAL CLINIC

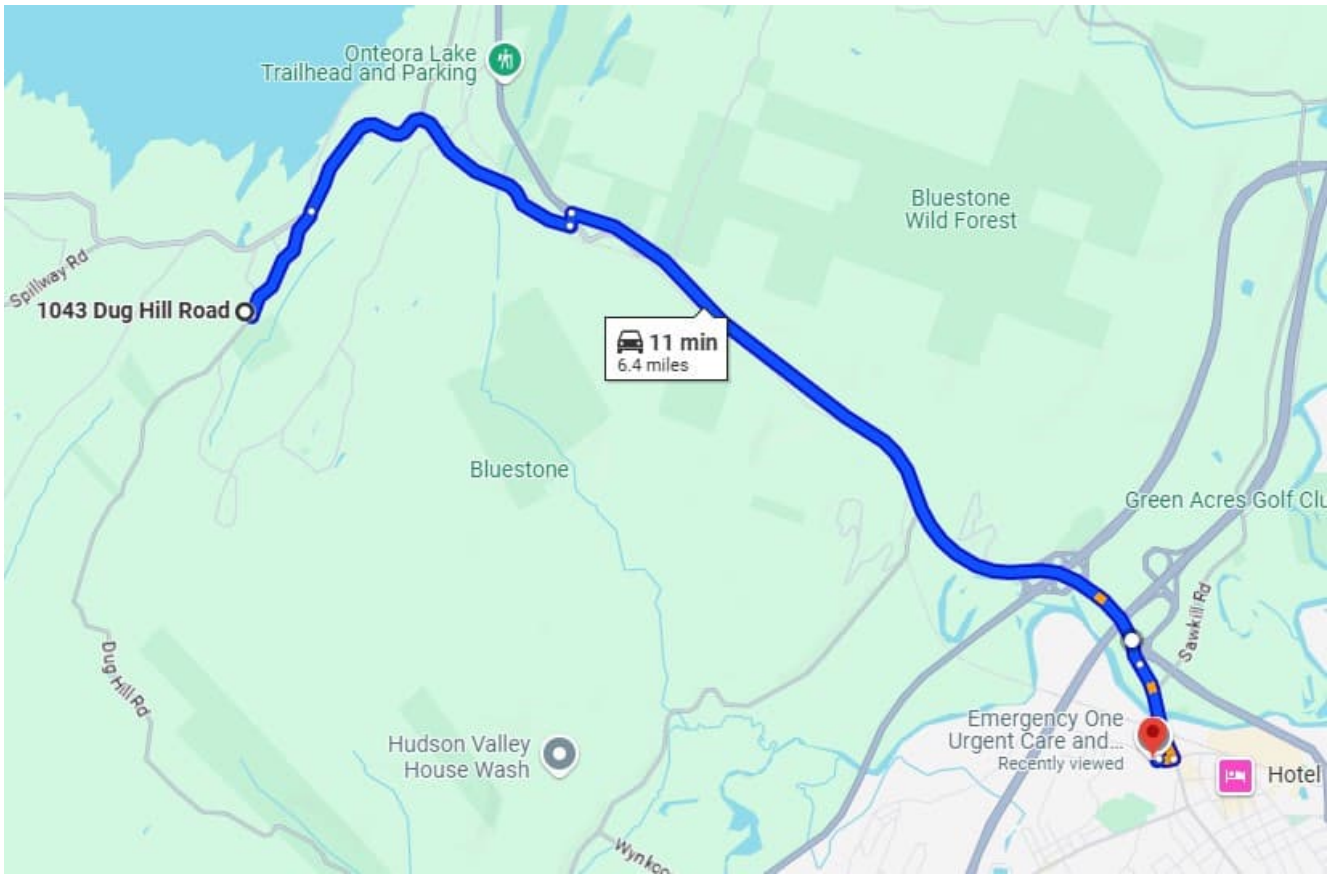
Emergency One **(845) 338-5600**

Address:	40 Hurley Ave, Kingston, NY 12401		
Hours of Operation:	8AM-8PM 7 days/week		
Travel Time:	11 Minutes	**Travel Distance:**	6.4 Miles

DRIVING DIRECTIONS TO OCCUPATIONAL CLINIC

11. From Site, turn left onto Dug Hill Rd. and head northeast for 0.6 miles.
12. Turn right onto NY-28A E and head east for 1.7 miles.
13. Turn left onto Waughkonk Rd. and head north for 308 feet.
14. Turn right onto NY-28 E and head southeast for 3.4 miles.
15. Slight right towards Washington Ave. and head southeast for 0.1 miles.
16. Merge onto Washinton Ave. and head southeast for 0.5 miles.
17. Turn right onto Hurley Ave. and head west for 361 feet and then turn left.
18. Arrive at hospital on the right.

ROUTE MAP TO OCCUPATIONAL CLINIC



4.2 Emergency Planning

AECOM requires that all projects plan for reasonably foreseeable emergencies (see Emergency Response Planning Procedure S3AM-010-PR1). Prior to the start of site operations, all personnel shall review Table 8-1 for site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Table 4-1: Method(s) of Alerting Personnel of an Emergency

☒ **Cell Phone**	☐ Hand Signal	☐ Radio (Channel No. _____)		☐ Satellite Phone
☐ **Host Facility Alarm** (specify):		[Insert Description]	=	[Insert Meaning]
		[Insert Description]	=	[Insert Meaning]
		[Insert Description]	=	[Insert Meaning]
		[Insert Description]	=	[Insert Meaning]

Table 4-2: Muster Locations and Evacuation Route(s)

Muster Location Type	Location Description
Primary:	■ Main Site Entrance
Alternate:	● Secondary Site Entrance
Shelter-In-Place:	♦ Field Vehicles
Muster Locations and Evacuation Route Map	

Table 4-2: Muster Locations and Evacuation Route(s)

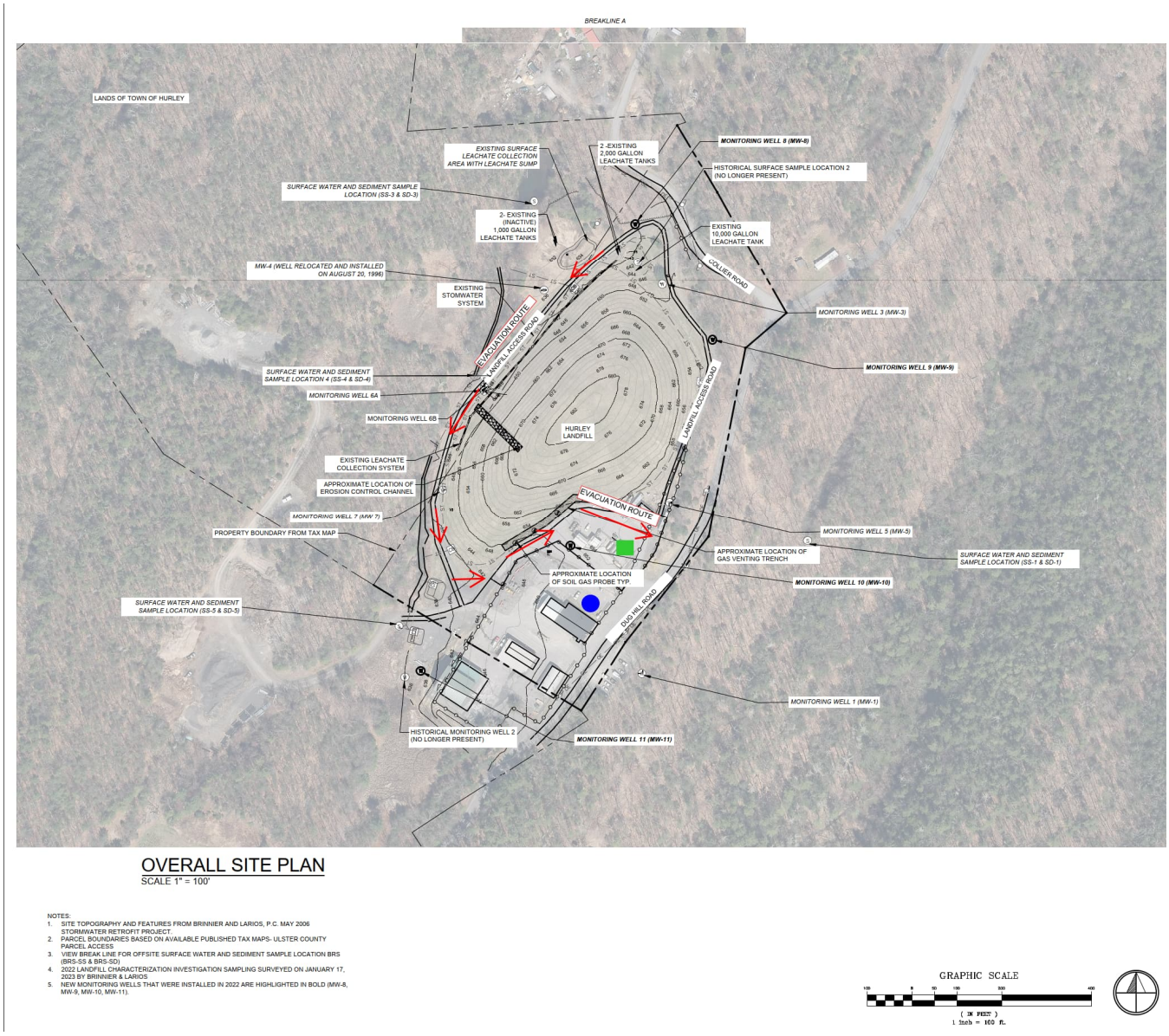


Table 4-3: Site Emergency Equipment and Its Location

ITEM(S)	ITEM DESCRIPTION	LOCATION(S)
First Aid Kit(s)	■ ANSI Z308.1 Class A, Type III; Qty=1 ■ ANSI Z308.1 Class B, Type III; Qty=1	■ AECOM Field Vehicle
Automated External Defibrillator(s) (AEDs)	■ Standard AED	■ N/A

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Table 4-3: Site Emergency Equipment and Its Location

ITEM(S)	ITEM DESCRIPTION	LOCATION(S)
Fire Extinguisher(s)	■ 2A:10: B:C (5 lb. ABC) ■ 4A:80B:C (10 lb. ABC) ■ 4A:80B:C (10 lb. ABC) ■ 8A:120b:C: (20 lb. ABC)	■ AECOM Fleet Vehicle(s) ■ Drill Rig/Geoprobe ■ Hot Work Area(s)
Spill Kit(s)	■ N/A	■ N/A
Satellite Phone(s)	■ N/A	■ N/A
Rescue Equipment	■ N/A	■ N/A
Wildlife Deterrent(s)	■ N/A	■ N/A
Emergency Shelter(s)	■ N/A	■ N/A
Emergency Ration(s)	■ N/A	■ N/A
Personal Locating Device(s)	■ Cell Phone	■ On Hand
Cold/Heat Stress Aids	■ Climate-Controlled Environment ■ Other (specify)	■ Field Vehicle(s) ■ Location

4.3 Potential Emergency Scenarios

This section covers emergency scenarios that could reasonably occur on the site or during work.

4.3.1 Evacuation

- If a situation requires an evacuation or emergency muster/assembly, the pre-determined alarm will be initiated.
- All personnel (e.g., workers, contractors, visitors) of the area requiring evacuation or muster/assembly will immediately assemble at the designated Muster Point, Assembly Point or Shelter-in-Place as determined by the alarm or communication.
- The Site Supervisor, Site safety lead, or designate will take action to account for all personnel, including visitors (i.e., head count, roll call).
- The Site Supervisor, Site safety lead, or designate shall ensure the appropriate emergency response is activated.
- Should it be determined that an individual is still within the hazard zone, establish whether a rescue can be safely attempted. Follow the 'Emergency Rescue Procedure' if properly trained and a rescue attempt will not put another individual in jeopardy.
- Personnel shall await further instruction from the Site Supervisor, Site safety lead, or designate (e.g., all clear and re-entry or further evacuation)

4.3.2 Medical Emergency

1. Stop the work activity.
2. Assess the cause of the injury to avoid injury to yourself (i.e. live wires, gases, hazardous materials).
3. Do not move the casualty unless they remain in danger.
4. First Aid Provider will designate an individual to call for medical assistance (e.g., ambulance, site medic).
5. First Aid Provider will designate an individual to retrieve the first aid kit and blankets.
6. Request assistance from other First Aid Providers as necessary. Administer first aid:
    a) Assess responsiveness: ask permission.
    b) Send for medical help.

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c) Place casualty/victim face up.
d) Check Airway, Breathing and Circulation ABC's
e) Control severe bleeding.

7. If CPR is deemed necessary:
   a) Begin chest compressions at a rate of at least 100 compressions per minute.
   b) CPR shall be continued until:
      i. until an AED is applied,
      ii. casualty begins to respond,
      iii. another first aid provider takes over,
      iv. medical help takes over, or
      v. physically unable to continue.
8. If the casualty begins to breathe on their own, place them in the recovery position, monitor and treat for shock as appropriate.
9. Individual in communication with the designated medical assistance shall attempt to answer any questions, stay on the line until information is verified and follow instruction.
10. Arrange for medical transport as needed. A designated individual should be positioned to direct medical transport to the casualty.
11. Personnel shall await further instruction from the Site Supervisor, Site safety lead, or designate (e.g., resume activity).

4.3.3 Lightning/Weather-Related Emergencies

Be Aware: Check the weather forecast before participating in outdoor activities. If the forecast calls for thunderstorms, postpone your trip or activity, or make sure adequate safe shelter is readily available. Many applications available for smart phones and devices have lightning alert capabilities or display lightning strikes on radar maps; download one for your smart phone and enable location services to receive alerts.

Go Indoors: Remember the phrase, "**When thunder roars, go indoors"**. If you see lightning and cannot count to 30 before hearing thunder, the lightning is too close for comfort. Find a safe, enclosed shelter when you hear thunder. Safe shelters include homes, offices, shopping centers, and hard-top vehicles with the windows rolled up.

Crouch Close to the Ground and Separate: If you are caught in an open area, crouch down in a ball-like position (**feet and knees together**) with your head tucked and hands over your ears so that you are down low with minimal contact with the ground. **Do NOT lie down**. Lightning causes electric currents along the top of the ground that can be deadly over 100 feet away. Crouching down is the best combination of being low and touching the ground as little as possible.

Separate: If you are in a group during a thunderstorm, separate from each other. This separation will reduce the number of injuries if lightning strikes the ground.

If a person is struck by lightning:

- Call 911 or other Emergency Services Contact.
- Assess the scene to ensure that continuing risk to rescuers does not exist if lightning strikes. For other electrical-related emergencies (non-lightning), ensure the source of electricity has been de-energized.
- Check to see if the victim is breathing and proceed with CPR if victim is not breathing.

4.3.4 Vehicle Incidents

All vehicles should be rented through Navan Travel (accessible via Ecosystem) to ensure that AECOM insurance is included in the rental rate. All other insurances should be declined. AECOM has negotiated contracts with Enterprise and National which are preferred vendors. If Enterprise or National are not available, Avis or Budget shall be used.

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In the event of a vehicle incident (including collisions as well as mechanical difficulties such as breakdowns and flat tires) the following response is recommended. For breakdowns and flat tires, contact an emergency provider. For rental vehicles, contact the rental company. To the extent possible, AECOM personnel should not change flat tires or perform similar repairs.

If a collision has occurred, assess the situation, and move all occupants (except the injured) out of further harm's way. If safe to do so, remove the car from the traveled way. Call 911 if necessary and report the incident to the Incident Hotline at 1-**800-348-5046** as soon as practical. If in an AECOM leased vehicle, contact our fleet manager, *Holman*, at 1-800-227-2273.If appropriate, wait for police to arrive. Provide insurance information to other drivers if necessary or requested, and collect the same (AECOM's rental vehicle insurance policy for Enterprise or Avis can be found on the DCS Americas United States or Canada travel pages). If possible, obtain names and phone numbers of witnesses. Take photographs of the scene. DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE, OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.

For personal vehicles used on AECOM business, contact an emergency provider.

4.3.5 Fire

AECOM employees are not expected to attempt to put out fires. Stop work; notify all AECOM personnel, move upwind and contact 911 and/or emergency response at the site. If employees have been properly trained in the operation of a fire extinguisher, they may attempt to put out a small fire, if the following conditions are met:

- The fire must be small (i.e., smaller than a trash can) and in its early stages.
- The employee must have an escape route.
- The employee must be trained and know they have the right type of extinguisher.
- The employee must be safe from toxic gases.
- There must be no hazardous conditions that could quickly accelerate the fire (e.g., presence of chemicals and/or combustibles, especially dry grass, etc.).
- Above all, if in doubt, the employee must not attempt to fight the fire.

4.3.6 Other

The following additional emergency scenarios could potentially occur based on the site and/or planned scope of work:

☐ Avalanche	☐ Emergency Rescue	☒ Severe Winter Storm	☐ Tornado
☐ Bear Attacks / Charges	☐ Explosion	☒ Spill or Release	☐ Wildfire
☐ Earthquake	☒ Floods/Heavy Rain	☐ No Other Credible Scenarios	
☐ Electrical Live Line Contact	☐ Gas Leak		

NYSDEC Petroleum Spill Requirements

All petroleum spills that occur at the site must be reported to the **NYSDEC Spill Hotline (1-800-457-7362)** within 2 hours of discovery, except spills which meet all of the following criteria:

- The quantity is known to be less than 5 gallons; and
- The spill is contained and under the control of the spiller; and
- The spill has not and will not reach the State's water or any land; and

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- The spill is cleaned up within 2 hours of discovery.

The AECOM Incident Hotline (800-348-5046), AECOM Department Manager, and SH&E Manager – East Environment (Caroline Lee 610-234-0407) must also be notified immediately in the event of a spill, and all emergency and follow-up procedures provided must be followed.

4.4 Fitness for Duty and Illness Reporting

AECOM employees should always live our life-preserving principle of “Fitness for Duty”, which requires employees to stay home from work when they are sick, as they are not “Fit for Duty” when ill, whether with the flu, Coronavirus, or other illness, especially contagious illnesses.

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5. Site Description

The Site, Town of Hurley Landfill, is located at 1043 Dug Hill Rd, West Hurley, NY 12491. The Site is 10.8-acres (tax parcel ID# 47.1-3-15) located approximately 0.6 miles south of the Ashokan Reservoir in the Town of Hurley, Ulster County, NY. There is an approximately 5-acre closed landfill footprint which encompasses a portion of the site. The former Hurley Highway Department building occupies the southern portion of the site, which is located adjacent to the inactive landfill area. The Town additionally owns the adjacent property to the west. The landfill has a domed profile with somewhat steep side slopes. The general area is forested with some residential properties to the north. A swampy area is located along the western side of the landfill. Southwest of the site is West Hurley Public Park. The property is bounded by Collier Road to the north and Dug Hill Road to the east.

5.1 Site Background/History

The site historically operated as a municipal solid waste landfill from the early 1960s to 1996 when it was closed using Landfill Closure State Assistance Program Funds. As with many landfills in existence in the past, the purpose of the landfill was two-fold: to dispose of the Town's refuse and to fill in lowlands that were considered to be of little value at the time, such as the stone quarry and swampy areas on the site. Potential environmental impacts of operating a landfill back then, were not considered. The following types of waste are documented as having been disposed of at this landfill site: municipal solid waste, C&D debris, brush, logs, and metal filings from Numrich Arms in West Hurley.

As the landfill area was filled in, the drainage flow through the landfill was halted, thereby causing the swamp on the southwestern side of the landfill to increase in size. In March of 1980, the town constructed a ditch in the bedrock, approximately 8-10 ‘deep in some sections, on the western side of the waste mass to provide drainage for the swamp.

Landfill closure activities occurred in the early 1990s and included installation of an engineered cover system, installation of gas vents and a gas venting trench, as well as installation of a leachate collection system. Leachate is collected through a system located beneath the landfill cap as well as a surface system constructed in 2001 to capture a seep that occurred after the landfill was capped.

The leachate collection system below the cap was constructed along the western edge of the landfill in an effort to collect leachate that migrated laterally. The collection system includes 548 linear feet of perforated collection line draining into two 2,000-gallon tanks. The collection system was installed to a depth of bedrock (with low permeability clay installed to create a suitable sub-base above the bedrock) or 12 ft maximum. It is worth noting that the as-built drawing indicates that the system was installed to the depth of bedrock other than for an approximate 250 ft length in the area of MW-4 where it was installed to a depth of 12 ft. In this area, high groundwater and silty sandy soils with very little cohesion made excavation difficult. Due to the bedrock the collection line was installed at a slope of 0.5% over its length. It is also noted that groundwater was encountered during the installation of the 2,000-gallon tanks and along a portion of the collection line.

Following the closure of the landfill, a leachate seep appeared at the surface to the west of the 2,000-gallon tanks. A surface leachate collection system (consisting of a berm and 2-1,000-gallon tanks) was constructed to capture this leachate and transfer it to the 2,000-gallon tanks for offsite treatment and disposal. A 10,000 gallon above ground storage tank was also installed to provide additional storage.

Since the closure of the landfill and installation of the surface leachate collection system, the Town has had the leachate hauled to the City of Kingston Wastewater Treatment Plant for treatment and disposal. At some point the Town reconfigured the system so that a pump installed within a sump in the system pumped directly to the below cap leachate collection system for storage in the 2,000-gallon tanks. Around 2007 the Town installed a stormwater conveyance system to collect the stormwater draining off the landfill cap and convey it to the western drainage swale.

In 2022, the Town made repairs to the system including the following: overgrown vegetation trimming and disposal, hand digging around all tanks to determine the condition of the piping and secondary containment, repair of the 4-inch PVC standpipe

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for the 10,000 gallon tank, repair of the clay berm, associated with the surface leachate collection system, purchase and install a new control system for tank pumps and alarms, and appropriate backfilling, grading and seeding for site restoration purposes.

During this investigation it was found that the 1,000 gallon tanks that were initially installed at the landfill to collect leachate did not include secondary containment and it could not be confirmed that the 10,000 gallon tank included secondary containment. Liquid was found in the secondary containment of the 2,000 gallon tanks which will require further investigation. In a report to the NYSDEC it was recommended that any future repairs or investigation be conducted following the results of the Site Characterization so that they can be incorporated as part of any remedial design as warranted. Due to the volume of leachate that was being hauled the Town additionally covered the surface leachate collection system with tarps to prevent stormwater intrusion into the system. The volume of leachate collected has been an ongoing concern at the landfill.

Post-closure water quality monitoring and off-site residential well monitoring at the Hurley Landfill was and will continue to be conducted on an annual basis in accordance with the approved Post Closure Monitoring and Facility Maintenance Manual for the Closure of the Hurley Landfill, prepared by Crawford & Associates, dated June 1996. It should be noted, however, that from 2013 to 2021, it appears that the annual monitoring was not completed for unknown reasons; but has resumed as of 2022.

There are five existing monitoring wells (MW-1, MW-3, MW-4, MW-6A, and MW-7) one upgradient (MW-1) and four downgradient (MW-3, 4, 6A and 7), as well as three surface water sampling locations from which samples are collected for annual monitoring purposes. One of the three surface-sampling sites is located off-site in the stream discharging in the direction of the former Betty and Ray's store off Route 28A (across the street from 689 Route 28A); the other two surface water sampling locations are located upgradient (SS-5) and downgradient (SS-3) of the surface leachate collection system for the former seep. Eight residential wells are also included in the annual sampling event as part of the post closure-monitoring program. Monitoring wells and surface samples are analyzed for 1993 Part 360 baseline parameters and a number of nearby residential water supply well samples are analyzed for the following select parameters: TDS, Alkalinity, Chloride, Ammonia, Barium, Iron, Manganese, Sodium.

Annual monitoring results for the wells and residential sample locations are compared to the groundwater standards and guidance values for Class GA waters, as listed in the N.Y.S Ambient Water Quality Standard and Guidance Values (T.O.G.S. 1.1.1) document. Surface water test results are compared to 6 NYCRR Part 701 Class A Standards due to the site's proximity to the Ashokan Reservoir, which is a water supply for New York City. Annual monitoring reports were historically, and will continue to be submitted to New York State Department of Environmental Conservation (NYSDEC), Region 3, the New York City Department of Environmental Protection (NYCDEP), the Ulster County Department of Health (UCDOH), and the Town of Hurley Supervisor & Deputy Supervisor for distribution to the residents in the monitoring program.

5.2 Client and/or Third-Party Operations at Site

The former Hurley Highway Department building occupies the southern portion of the site, as does the active transfer station complex and a salt storage structure; all of which are located adjacent to the inactive landfill area. As of the date of this report, the Highway Department has been vacated; however, the transfer station is still in operation and the salt storage structure is still actively used.

5.3 Scope of Work

The objective of this project is to conduct the required remedial investigation (RI) with the aim to delineate the horizontal and vertical extent of contamination and complete the feasibility study (FS). As part of the RI, AECOM will re-evaluate the surface and subsurface characteristics of the Site to identify data gaps and refine the Site Conceptual Model. AECOM will summarize Site characteristics including Site features, topography, depth to groundwater and flow direction, assess the nature and extent of contamination, assess contaminant fate and transport mechanisms, assess potential exposure pathways to human and ecological receptors, complete the FS and, if appropriate, recommend remedial activities to address Site contamination.

The project scope for 2025 includes the following:

- Development of a Remedial Investigation Work Plan (RIWP) that specifies the areas to be investigated, the methodologies for sampling and data collection, and the protocols for ensuring safety throughout the process.

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- Thermal infra-red mapping of the landfill performed by AECOM to identify potential water/leachate discharge points from the landfill to the surrounding areas.
- An inspection by AECOM staff of Site infrastructure, including the leachate system, holding tanks and a video assessment of the storm sewer upgradient of the landfill performed by a subcontractor under AECOM's supervision.
- Subsurface utility mark-out with Ground Penetrating Radar (GPR) and other technologies will be performed by a subcontractor under AECOM's supervision prior to drilling.
- 10 new monitoring wells (MW) to be installed; 5 MWs up to 50 feet below ground surface (bgs) and 5 MWs up to 100 feet are proposed.
- Laboratory samples: 15 soil samples, 25 groundwater (GW) samples (including 11 existing wells), 10 sediment samples, and 10 surface water samples (including QAQC parameters) will be collected and analyzed.
- All investigation derived waste (IDW) such as soil spoils, decontamination fluids, well development and purge water will be contained in NYSDOT-approved 55-gallon drums for later off-site disposal and will be staged at a secure area on-Site until transport and disposal is arranged.
- AECOM will draft the RI report, which includes a description of field activities conducted, a summary of previous investigations, a description of RI fieldwork activities, a discussion of analytical results, a description of the physical characteristics at the Site, a discussion of the nature and extent of contamination in the various environmental media, a discussion of the conceptual model and contaminant fate and transport mechanisms, a Qualitative Human Health Risk Exposure Assessment, a Fish and Wildlife Resource Impact Analysis, a summary with conclusions and recommendations, several site figures, data summary tables of detected compounds and non-compliance values highlighted, field notes, logs and forms, and a Data Usability Report (DUSR) validating the laboratory data.

What means of transportation will be used to get to the jobsite?

☒ Rental or personal vehicle (include Driving Task Hazard Assessment)

☐ I will use other means of transportation*

*While AECOM always encourages the use of public transportation - in those instances where an employee is unfamiliar with a city, area, or transportation system, or the employee is apprehensive about using public transportation please use Uber or some other form of prearranged transportation. When using Uber or something similar never share the ride with anyone you don't know.

A Task Hazard Assessment (THA) for each operation being performed by AECOM and each operation performed by an AECOM subcontractor working under the AECOM HASP must be included in **Attachment A**, while those performed by the managed subcontractors should be prepared by the subcontractor.

Table 5-1: Task List

Task Name	Permit(s) Required		Primary Task Performed By		
			AECOM	SUB	Third-Party
Drilling, Grouting, Monitoring Wells	☐ Yes	☒ No	☐	☒	☐
Driving to and From Site	☐ Yes	☒ No	☒	☒	☐
Gauging Groundwater Monitoring Wells	☐ Yes	☒ No	☒	☐	☐
Geophysical Logging	☐ Yes	☒ No	☐	☒	☐
Geophysical Drilling Oversight	☐ Yes	☒ No	☒	☐	☐
Groundwater Sampling – Low Flow	☐ Yes	☒ No	☒	☐	☐
Hand and Power Tools	☐ Yes	☒ No	☒	☒	☐
Hollow Stem Auger Drilling Oversight	☐ Yes	☒ No	☒	☐	☐
Investigation Derived Waste Management	☐ Yes	☒ No	☐	☒	☐
Land Survey (At Grade)	☐ Yes	☒ No	☐	☒	☐

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Table 5-1: Task List

Task Name	Permit(s) Required		Primary Task Performed By		
			AECOM	SUB	Third-Party
Load and Unload Vehicle	☐ Yes	☒ No	☒	☒	☐
Monitoring Well Construction	☐ Yes	☒ No	☐	☒	☐
Oversight of Utility Clearance	☐ Yes	☒ No	☒	☐	☐
Site Walk – General Site Visit	☐ Yes	☒ No	☒	☒	☐
Soil Sampling with Hand Auger	☐ Yes	☒ No	☒	☐	☐
Surface Soil Sampling	☐ Yes	☒ No	☒	☐	☐
Surface Water Sampling – Pore Water	☐ Yes	☒ No	☒	☐	☐
Surface Water Sampling – Swing Sampler	☐ Yes	☒ No	☒	☐	☐

5.4 Key Dates

Project Start Date:	July 3, 2025
Field Work Start Date:	July 22, 2025
Project Completion Date:	TBD

5.5 Physical and Biological Hazards

Physical and biological hazards are hazards that threaten the physical safety of an individual; contact with the hazard typically results in an incident or injury. The following table summarizes the physical and biological hazards present at the site and the associated procedures that address protection and prevention of harm.

- **If a there is a potential of physical or biological hazard when performing a specific task, it must be addressed in the THA.**

Some tasks are considered High Potential (HiPo) Hazard Activities as identified in S3AM-209-PR1, Risk Assessment, based on the factors contributing to the severity and probability of credible outcomes resulting from ineffective mitigation of their hazards and are designated with "**HH**" in the table below. High potential hazard activities typically require additional documents such as a Safe Work Permit (S3AM-218-FM1), activity-specific permit, site specific plans, task/equipment-specific training, pre-use inspections, a competent person, etc.

All checked procedures MUST be included in **Attachment B** for implementation and reference. The following hazards and their site-specific description are anticipated based on the scope of work and project site:

Table 5-2: Anticipated Activities, Situations and Physical & Biological Hazards

Activity / Situation / Physical or Biological Hazard	Applicable SH&E Procedure(s)	Related Activity-Specific Permit or Plan (Typically Required)
☒ **Bloodborne Pathogens**	S3AM-111-PR1	n/a
☒ **Cold Stress**	S3AM-112-PR1	n/a
☒ **Compressed Gases**	S3AM-114-PR1	n/a
☒ **Concrete Work** **HH**	S3AM-338-PR1	n/a
☒ **Corrosive Reactive Materials**	S3AM-125-PR1	n/a
☒ **Drilling, Boring & Direct Push Probing** **HH**	S3AM-321-PR1	n/a
☒ **Driving**	S3AM-005-PR1	S3AM-005-FM1

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Table 5-2: Anticipated Activities, Situations and Physical & Biological Hazards

Activity / Situation / Physical or Biological Hazard		Applicable SH&E Procedure(s)	Related Activity-Specific Permit or Plan (Typically Required)
☒ **Flammable and Combustible Liquids**		S3AM-126-PR1	n/a
☒ **Hand and Power Tools (drill, chainsaw, grinder, power saw, pressure washer, etc.)**	HH	S3AM-305-PR1	n/a
☒ **Hand Hazards**		S3AM-317-PR1	n/a
☒ **Hazardous Waste Operations**	HH	S3AM-117-PR1	n/a
☒ **Heat Stress**		S3AM-113-PR1	S4DCS-AM-113-FM1
☒ **Heavy Equipment**	HH	S3AM-309-PR1	S3AM-218-FM1
☒ **Manual Lifting**		S3AM-014-PR1	n/a
☒ **Material Storage**		S3AM-316-PR1	n/a
☒ **Non Ionizing Radiation**		S3AM-121-PR1	n/a
☒ **Overhead Lines and Obstructions**	HH	S3AM-322-PR1	S3AM-218-FM1
☒ **Respiratory Protection**	HH	S3AM-123-PR1	Respiratory Protection Plan
☒ **Signs, Signals, and Barricades**		S3AM-346-PR1	n/a
☒ **Underground Utilities**	HH	S3AM-331-PR1	S3AM-331-FM1
☒ **Wildlife, Plants, and Insects**		S3AM-313-PR1	n/a
☒ **Working On and Near Water**	HH	S3AM-315-PR1	n/a

Note: **HH –** High-Hazard Activity or Situation

5.5.1 Competent Persons

A competent person is an employee who, through education, training, and experience, has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. AECOM's Competent Person Designation Procedure, S3AM-202-PR1, explains the roles, responsibilities and procedures of naming a competent person.

Table 5-3: Competent Person Log

☒ Scope of Work requires one or more competent persons (see table below)
☐ None, Scope of Work does not require competent persons(s).

	Activity / Area of Competency	Name of Person (Affiliation) Note: Subcontractors may provide this person
☐	**Asbestos**	■ NA
☐	**Assured Equipment Grounding Conductor**	■ NA
☐	**Blasting & Explosives**	■ NA
☐	**Concrete & Masonry Construction**	■ NA
☐	**Confined Spaces**	■ NA
☐	**Control of Hazardous Energy (Lockout-Tagout)**	■ NA
☐	**Crane Assembly / Disassembly**	■ NA
☐	**Cranes & Derricks**	■ NA
☐	**Demolition**	■ NA

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Table 5-3: Competent Person Log

☒ Scope of Work requires one or more competent persons (see table below)
☐ None, Scope of Work does not require competent persons(s).

	Activity / Area of Competency	Name of Person (Affiliation) Note: Subcontractors may provide this person
☒	**Electrical Wiring Design & Protections**	■ NA
☐	**Elevated Work Platforms & Aerial Lifts**	■ NA
☐	**Fall Protection**	■ NA
☐	**Hearing Protection**	■ NA
☒	**Heavy Equipment**	■ Drilling subcontractor not yet determined, the will provide competent person
☐	**Ionizing Radiation**	■ NA
☐	**Lead**	■ NA
☐	**Material Hoists & Personnel Hoists**	■ NA
☐	**Respiratory Protection**	■ NA
☐	**Rigging Equipment**	■ NA
☐	**Scaffolds**	■ NA
☐	**Stairways & Ladders**	■ NA
☐	**Steel Erection**	■ NA
☐	**Trench & Excavations**	■ NA
☐	**Underground Construction**	■ NA
☐	**Welding & Cutting**	■ NA

5.6 Chemical & Airborne Hazards/ Constituents of Concern

Airborne and chemical hazards are types of occupational hazards caused by workplace exposures. Exposure to airborne materials and chemicals in the workplace can cause acute or long-term detrimental health effects. Potential exposure to these hazards on AECOM projects can come from several sources including materials brought on site to perform work, constituents of

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concern found in environmental media under investigation, and simultaneous operations being performed at the site by the property owner/third parties.

Based on information obtained from historical investigations and other sources, the chemicals in the table below are known or suspected to be present at the site.

Table 5-4: Summary of Hazardous Properties of Chemical and Airborne Hazards

***Notes: PEL** = Permissible Exposure Limit | **TLV** = Threshold Limit Value | **IP** = Ionization Potential | **eV** = Electron Volt*

Chemical Name	Media	Primary Routes of Exposure	PEL	TLV	IP (eV)
Metals					
Aluminum	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Inhalation	5.0 mg/m^3	5.0 mg/m^3	n/a
Arsenic	☐ Soil ☐ Groundwater ☐ Vapor ☒ Sediment	Dermal	0.5 mg/m^3	0.2 mg/m^3	n/a
Cobalt	☐ Soil ☐ Groundwater ☐ Vapor ☒ Surface Water	Dermal	0.1 mg/m^3	0.02 mg/m^3	n/a
Copper	☐ Soil ☐ Groundwater ☐ Vapor ☒ Sediment	Dermal	1.0 mg/m^3	1.0 mg/m^3	n/a
Iron	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Ingestion	5.0 mg/m^3	5.0 mg/m^3	n/a
Lead	☒ Soil ☒ Groundwater ☐ Vapor ☒ Sediment and Surface Water	Dermal	0.05 mg/m^3	0.05 mg/m^3	n/a
Manganese	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Dermal	5.0 mg/m^3	0.2 mg/m^3	n/a
Nickel	☐ Soil ☐ Groundwater ☐ Vapor ☒ Sediment	Dermal	1.0 mg/m^3	0.5 mg/m^3	n/a
Sodium	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Dermal	5.0 mg/m^3	5.0 mg/m^3	n/a
Vanadium	☐ Soil ☐ Groundwater ☐ Vapor ☒ Surface Water	Dermal	0.05 mg/m^3	0.05 mg/m^3	n/a
Zinc	☒ Soil ☐ Groundwater ☐ Vapor ☐ N/A	Dermal	15 mg/m^3	10 mg/m^3	n/a
Per- and Polyfluoroalkyl Substances (PFAS)					
Perfluorooctanoic Acid (PFOA)	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Ingestion	n/a	1.0 mg/m^3	n/a
Perfluorooctane Sulfonic Acid (PFOS)	☒ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water and Sediment	Ingestion	n/a	1.0 mg/m^3	n/a
Other Common Site COCs					
1,4-Dioxane	☐ Soil ☒ Groundwater ☐ Vapor ☒ Surface Water	Inhalation	100 ppm	20 ppm	9.13
Benz(a)anthracene	☐ Soil ☐ Groundwater ☐ Vapor ☒ Surface Water	Inhalation	0.2 mg/m^3	0.2 mg/m^3	n/a
Benzo(b)fluoranthene	☐ Soil ☐ Groundwater ☐ Vapor ☒ Surface Water	Inhalation	0.2 mg/m^3	0.2 mg/m^3	n/a

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5.7 Decontamination

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities. Decontamination steps are outlined in the Hazardous Waste Operations procedure S3AM-117-PR1. All decontaminated equipment shall be visually inspected for contamination prior to leaving the Contaminant Reduction Zone (CRZ).

Table 5-5: Decontamination Procedures & Equipment

Procedure	Equipment Needed
Decontamination will take place in the area designated as the CRZ. Personnel egress to and from this zone will be limited in order to minimize the potential spread of contaminated sediments to clean areas. Under no circumstances is a potentially contaminated person to exit the site by means other than through the CRZ, except in emergencies as directed by the Site Health and Safety Officer. Upon leaving the site for any reason, personnel will be required to remove all contaminated clothing or equipment before leaving the CRZ. For Level D PPE, disposable gloves will be disposed of as municipal waste. All personnel wearing Modified Level D PPE in a work area must undergo decontamination prior to entering a SZ. In the CRZ, the personnel decontamination area will consist of the following stations: • Station 1: Personnel entering the CRZ will remove the sediment contamination from their outer clothing, boots and instruments using brushes and cloths. Personnel will also wipe down respirators if they have been used. • Station 2: Personnel will remove their outer garment and outer gloves and dispose of them as municipal waste. Personnel will then decontaminate their boots, with an aqueous solution of detergent or other appropriate cleaning solution. These items will then be hand carried to the next station. Inner gloves may then be discarded as municipal waste. • Station 3: Personnel will thoroughly wash their hands and face before leaving the CRZ. Air purifying cartridges will be removed from respirators, if used, and then sanitized, dried and placed in a clean plastic bag.	• Soft-bristle scrub brushes or long-handled brushes to remove contaminants; • Hoses, buckets of water or garden sprayers for rinsing; • Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions; • Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment; • Metal or plastic cans or drums for the temporary storage of contaminated liquids; and • Paper or cloth towels for drying protective clothing and equipment.

Table 5-6: Equipment Decontamination Procedures

Type Equipment	Decontamination Solution	Procedure
Larger equipment	PFAS-Free Water Detergent Chemical cleaner	A high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.
Smaller equipment		• Remove majority of visible gross contamination in EZ. • Wash equipment in decontamination solution with a scrub brush and/or power was heavy

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		equipment. • Rinse equipment. • Visually inspect for remaining contamination.

6. Air Monitoring

Potential exposure to chemical hazards from sources including materials brought on site to perform work, constituents of concern found in environmental media under investigation, and/or simultaneous operations being performed at the site by the property owner/third parties are reasonably anticipated to have the potential to result in vapors, fumes, aerosols, mists, and/or airborne particulates/dusts at or near permissible exposure limits. Therefore, air monitoring that will be implemented is described below.

6.1 Real Time Exposure Measurements/Equipment

Monitoring shall be performed within the work area on site to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in the work permit and THA as work is performed. All instrumentation needs to be rated intrinsically safe to prevent fire or explosion.

Table 6-1: Air Monitoring Instrumentation Needed

Instrument		Manufacturer/Model	Substances Detected
☐	**Photo Ionization Detector (PID)**	■ RAE Systems mini-RAE ■ Photovac Microtip ■ Hnu Model Hnu (min. 10.6 eV bulb)	■ Petroleum hydrocarbons ■ Organic Solvents
☒	**Particulate Monitor**	■ MIE Model PDM-3 mini-RAM	■ Aerosols, mist, dust, and fumes

6.2 Monitoring Procedures

The monitoring procedures shown below are general guidelines for sampling activities. In general, readings are considered actionable if sustained readings are observed for 5 minutes or more or if intermittent peaks are seen more than 1 time the action level. A reading more than action level outlined below will require additional ventilation (natural or mechanical) for 30 minutes, followed by re-monitoring.

Table 6-2: Monitoring Procedures and Action Levels

	Parameter	Zone Location and Monitoring Interval	Action Level	Response Activity
☐	**Volatile Organic Compounds (VOCs) and Volatile Hydrocarbons** (total by PID)	Breathing zone, continuously during tasks where exposure to VOCs and volatile hydrocarbons is possible	< 5 ppm	■ Continue monitoring, may continue work in required PPE
			5- 25 ppm (sustained for 5 minutes)	■ **STOP WORK** and notify PM. Investigate the cause of elevated VOC measurements and identify measures to reduce concentrations (cover impacted soils, ventilation, etc.). Work activities shall only continue once levels have decreased to or below 5 units above background. If levels continue above 5 units, only individuals who are medically qualified to wear respiratory protection are permitted to continue work activities with Project Manager approval. Don Level C PPE

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Table 6-2: Monitoring Procedures and Action Levels

	Parameter	Zone Location and Monitoring Interval	Action Level	Response Activity
				(organic vapor respirator cartridges), continue monitoring, and initiate continuous air monitoring for benzene.
			> 25 ppm (sustained for 5 minutes)	■ Cease work, exit, and contact the Site safety lead, Site Supervisor, and Project Manager.
☒	**Dust not otherwise classified** (total by aerosol monitor)	Breathing zone every 30 minutes during field activities where exposure to excessive dusts are possible	< 5 mg/m^3	■ Continue work in Level D and continue monitoring
			> 5 mg/m^3	■ Upgrade to Level C (P100 respirator cartridges), implement dust suppression measures; contact the Site safety lead & Site Supervisor.
			> 10 mg/m^3	■ Cease activities, implement more effective dust suppression measures; contact the Site safety lead & Site Supervisor.
☒	**Dust not otherwise classified** (total by aerosol monitor)	Edge of Exclusion Zone, every 30 minutes during excavation activities	< 5 mg/m^3	■ Continue work in required PPE, monitor air, and implement engineering controls
			> 5 mg/m^3	■ Cease activities and contact the Site safety lead & Site Supervisor.

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7. Subcontractor Selection

7.1 Subcontractor Pre-Qualification

Ensure all subcontractors including lower tier subcontractors are prequalified to perform work for AECOM. Coupa is the preferred method for pre-qualifying subcontractors. If a subcontractor is conditionally approved, ensure the subcontractor meets all conditions of approval. If a subcontractor requires a variance, complete the Subcontractor Variance form, S3AM-213-FM2.

Subcontractor 1:	**Subcontractor's Name**

Scope of Work:

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Task #1 ■ Task #2	■ Yes or No	Click here to enter Name and #

Required Subcontractor Documents:
PM must verify that the following documents are in-place for each subcontractor; check to verify.

Select One: ☐ Subcontractor's Project/Site-specific Health and Safety Plan **OR** ☐ Subcontractor will work under AECOM's Health and Safety Plan and field personnel will sign the AECOM HASP Acknowledge Form	■ Copy of task specific THAs/JHAs and inspection/tailgate forms
	☐ Competent Person Documentation
	☐ Copy of their business license and training certificates (task specific)
	☐ Copy of their Corporate Safety Management Manual
	☐ Copy of the signed contract

Prequalification Status

Supplier Status		Action(s)
☐ Approved		None, skip to next subcontractor
☐ Conditionally Approved		List condition(s) of approval below and describe how condition(s) will be met.
☐ Pending Approval		Subcontractor is **NOT** approved for use

Safety Conditions of Approval that Apply to Subcontractor *(check all that apply)*

☐	AECOM PM will prepare and obtain AECOM SH&E approval of a variance to use this subcontractor. AECOM PM will ensure the control measures listed in the variance are implemented.
☐	Subcontractor will work under the AECOM HASP. AECOM PM will verify that the AECOM HASP covers the subcontractor's scope of work. Subcontractor's field personnel will review the AECOM HASP and sign the HASP Acknowledgement Form (Section19).
☐	Subcontractor has prepared a Site-Specific HASP for their activities that has been reviewed and accepted by AECOM SH&E.
☐	AECOM Site Supervisor and/or Site safety lead will supervise the subcontractor's field activities at the Site.
☐	Other: Click here to Describe

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Subcontractor 2:	**Subcontractor's Name**

Scope of Work:

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Task #1 ■ Task #2	■ Yes or No	Click here to enter Name and #

Required Subcontractor Documents:
PM must verify that the following documents are in-place for each subcontractor; check to verify.

Select One:	
☐ Subcontractor's Project/Site-specific Health and Safety Plan **OR** ☐ Subcontractor will work under AECOM's Health and Safety Plan and field personnel will sign the AECOM HASP Acknowledge Form	■ Copy of task specific THAs/JHAs and inspection/tailgate forms
	☐ Competent Person Documentation
	☐ Copy of their business license and training certificates (task specific)
	☐ Copy of their Corporate Safety Management Manual
	☐ Copy of the signed contract

Prequalification Status

Supplier Status		Action(s)
☐ Approved		None, skip to next subcontractor
☐ Conditionally Approved		List condition(s) of approval below and describe how condition(s) will be met.
☐ Pending Approval		Subcontractor is **NOT** approved for use

Safety Conditions of Approval that Apply to Subcontractor *(check all that apply)*

☐	AECOM PM will prepare and obtain AECOM SH&E approval of a variance to use this subcontractor. AECOM PM will ensure the control measures listed in the variance are implemented.
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☐	Subcontractor has prepared a Site-Specific HASP for their activities that has been reviewed and accepted by AECOM SH&E.
☐	AECOM Site Supervisor and/or Site safety lead will supervise the subcontractor's field activities at the Site.
☐	Other: Click here to Describe

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8. Training and Documentation

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure S3AM-003-PR1 establishes the general training requirements for AECOM employees.

8.1 Site-Specific Training Requirements

The following training is applicable to the site and/or scope of work:

Table 8-1: Site Specific Training Requirements

Training		Applies to
☒	**ERP/HASP and Site Orientation**	All Employees and Subcontractors
☒	**Vehicle/Driver Safety & Defensive Driving**	All Employees who drive on behalf of AECOM
☒	**Field Safety**	Employees visiting the field that does not require HAZWOPER
☒	**Speak Up/Listen Up (SULU)**	All AECOM field employees and supervisors
☒	**First Aid / CPR**	Designated employees or employees performing high risk activities and medical attention is more than 4 minutes away
☒	**OSHA 10-Hr. Construction Safety (or CSTS 2020 in Canada)**	All employees working on jobsites with construction type hazards
☐	**OSHA 30-Hr. Construction Safety**	All employees supervising/overseeing jobsites with construction type hazards
☒	**HAZWOPER 40-Hour and 8-Hr. Annual Refresher**	On HAZWOPER sites, in EZ, exposed to hazardous contamination
☒	**HAZWOPER Supervisor**	Employees managing others in HAZWOPER activities or at HAZWOPER Sites
☒	**Hazardous Materials Shipping (U.S.)**	Employee responsible for shipping HZM/HZW/DG and/or signing manifests
☒	**Hazardous Materials Communication**	When hazardous or toxic chemicals are being used on site.

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9. Site Control

9.1 Site Work Zones

Site layout and site control need to be coordinated to achieve a productive work environment and efficient work process while minimizing exposure of employees and the public to hazards associated with the work. Consider the following items when planning the site layout and controls. Check the description of the site controls **already** in place:

Table 9-1: Site Controls Already in Place

- ☒ Work area is within a facility/property with secure and restricted access provided by client or third party
- ☐ Work area is enclosed within a facility/property, but access is not restricted via locks, guards, or gates
- ☐ Work area is on a property that is open, but access by the public is unlikely
- ☐ Work area is on a property that is open and access by the public is likely
- ☐ Work area is in a roadway or right of way of a roadway (Traffic Control/Protection Plan required S3AM-306-PR1)
- ☐ Work area is in a parking lot or driveway
- ☐ Work area is on or near railroad, including right of way, active lines and crossings
- ☐ Other: N/A

Consider the following items when planning the site layout and controls:

- "Line of Fire" hazards- overhead utilities, falling/ tipping equipment, release of energy/ pressure, flying debris
- Noise, dust, odor suppression
- Contamination containment and decontamination area layout
- Traffic control for site vehicles/ equipment (public traffic control requires Traffic Control Plan)
- Restricted access for areas requiring special training, skills, or certifications
- Restriction of work near railroads
- Presence or creation of excavations
- Loading/unloading areas
- Portable restrooms
- Dumpsters and bins
- Equipment lay down
- Heavy equipment parking
- Overnight safety and security needs

The following additional site controls will be implemented in work area(s) to protect the public and AECOM work team:

Table 9-2: Additional Site Controls to be Implemented

Control Item	Description of Type and Application
☒ **Fence**	Perimeter fence on the north and east sides of property
☒ **Locks**	Property is locked by the client. Copy of keys will be provided as necessary.
☐ **Barricades**	N/A
☐ **Cones**	N/A

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☐ **Tape**	N/A
☐ **Hole Covers**	N/A
☐ **Other:**	N/A

9.2 Simultaneous Operations

Simultaneous and neighboring operations, including activities performed by the general public, our clients, and other workers or contractors working near our employees, often present a need for added co-ordination and communication to address hazards that are presented by multiple operations.

Table 9-3: Simultaneous Operations Within the Site

☐ Yes, see table below for details ☐ None, not applicable

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)	
Salt storage, as a transfer station	Town of Hurley Highway Department	Michael Shultis	(845) 338-4067	☐ Yes	☒ No
				☐ Yes	☐ No
				☐ Yes	☐ No

Table 9-4: Simultaneous Operations on Neighboring Sites

☐ Yes, see table below for details ☒ None, not applicable

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)	
				☐ Yes	☐ No
				☐ Yes	☐ No
				☐ Yes	☐ No

9.3 Site Control Maps/Diagrams

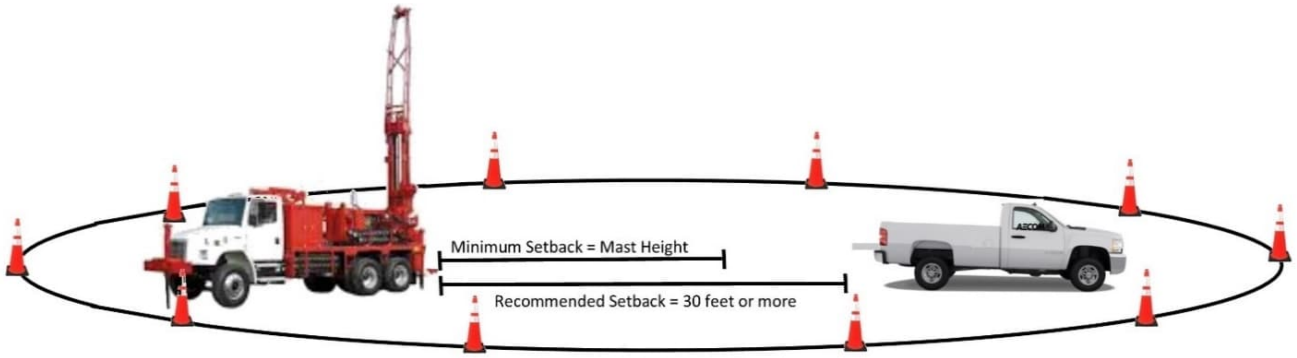
Insert diagrams and/or maps to document the site layout and controls (barricades, fences, cones, caution tape, etc.) that will be used. Identify exclusion zone, contamination reduction zone, and support zone as applicable.

Work Area Layout

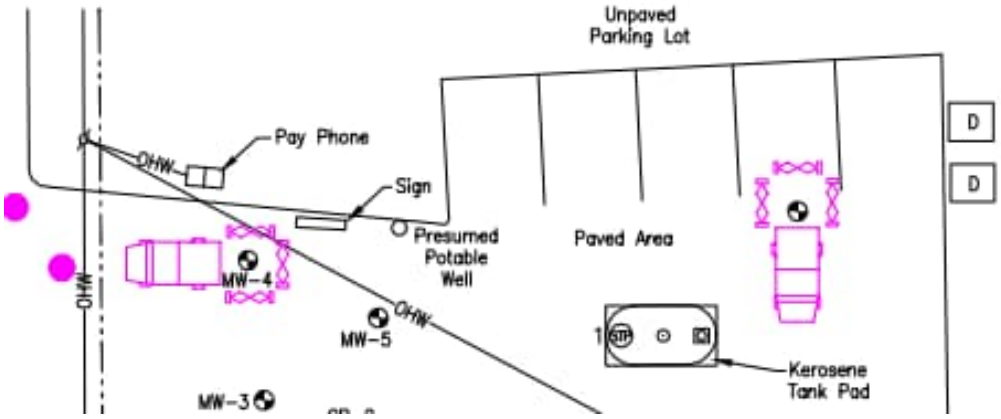
Example Drilling Work Area Layout

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Work Area Layout



Example Groundwater Sampling Area Layouts



9.4 Situational Awareness – Personal Security

The ability to observe, identify, process, and understand critical elements of information within changing environments. If you see something, say something. Know what is going on around you, anticipate what might happen next. Have a plan of what you will do next, including where you are going, alternate routes and a plan of action. Evaluate what is happening around you as you move through daily activities, noting if something looks out of place or unusual. Be aware of barriers that may change your critical thinking such as distractions, being in a hurry, fatigue, focus lock and past experiences. Listen to your instinct – if something doesn't look or feel right, do something about it. All employees need to review the Situational Awareness Guidance for Employees. In event of a Security Issue please contact **Global Security & Resilience at** **GSR@aecom.com.**

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10. Personal Protective Equipment

The use of Personal Protective Equipment (PPE) forms the final barrier of protection between the employee and the hazard and applies to all employees at the work site, including Subcontractors, visitors and client or customer representatives. For additional information on PPE, please review the Personal Protective Equipment, S3AM-208-PR1.

The minimum PPE required on an AECOM project is as follows:

- Hard Hat or Helmet
- Safety Glasses with side shields
- High Visibility Safety Vest
- Shirt with sleeves that cover the shoulders.
- Long Pants
- Safety-toe Boots
- Gloves (on person) – Required to be worn if handling materials, equipment, etc.

Specific PPE shall also be specified in Task Hazard Analyses (THAs) such as glove type (i.e. material, level of protection, etc.). Where possible, hazards will be eliminated or controlled to reduce the risk associated with a specific task.

These controls include:

- Elimination of the hazard
- Isolation of the hazard
- Engineering Controls
- Administrative Controls

With the exception of prescription safety eyewear and safety toed boots (there may be allowances for the purchase of these items), AECOM will make available all required PPE for its employees. All employees will receive training in the use, care, maintenance, and storage of the PPE issued to them.

All personal protective equipment will meet the requirements of local, state, federal, client and AECOM SH&E regulations and procedures. Where site-specific PPE requirements exist, all AECOM employees, subcontractors, and visitors, who work on the Project, will follow those requirements.

- PPE will **not** be modified or changed.
- All PPE that is damaged or in need of service or repair will be removed from service immediately.
- All PPE that has been removed from service will be tagged “OUT OF SERVICE” and will not be returned until repaired and inspected by a qualified person. Defective PPE must be removed from site to prevent it from being used.

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11. SH&E Technology

At AECOM, we encourage the use of new technology to eliminate or reduce the risk our employees are exposed to. Mark the technology you will be using in this project (if any):

Table 11-1: SH&E Technology Being Used on Site/Project

- ☑ **Wearable Technology/Smart PPEs** (e.g. clothes, helmets, glasses, harness)
- ☐ **Site Sensors** (e.g. Movement, angle, noise, carbon monoxide, Dust)
- ☐ **Fatigue Monitoring**
- ☑ **Phone/Tablet Applications** or software: Google Maps/Earth
- ☐ **Connected Worksites** (i.e., connection between employees or project elements to be successful)
- ☐ **Drones**
- ☐ **Virtual Reality (VR) or Augmented Reality (AR)**
- ☐ **GPS** – Location devices: Click here to enter Location Devices
- ☐ **Radio Frequency Identification** (RFID)
- ☐ **Other:** Click here to enter Other
- ☐ **None of these:** We will not use any technology in this project to reduce hazards

Find available tools and/or share the tools you will be using in the AECOM Technology Toolbox or let us know what would be interesting to assess by **clicking here** or explore in the NSC Technology site for new available safety technology.

12. Safety, Health, and Environment Program

12.1 AECOM SH&E Policy

AECOM's Safety, Health and Environment Policy, which establishes the framework to attain best-in-class Safety, Health and Environmental (SH&E) performance in the interest of benefitting AECOM's employees and stakeholder in the global marketplace, is available on AECOM's Ecosystem (intranet).

12.2 Safety for Life

"Safety for Life" is a comprehensive integrated AECOM Safety Management System that drives our employees toward AECOM's commitment to achieving zero work-related injuries and/or illnesses; preventing damage to property and the environment; and maintaining an environmentally friendly and sustainable workplace. Our Safety for Life program is supported by nine Life Preserving Principles that apply to all AECOM activities.

12.3 Life Preserving Principles

AECOM has adopted these "Life-Preserving Principles" to help demonstrate the commitment of our Safety for Life program. We firmly believe these "Life-Preserving Principles" will enable AECOM to achieve its goal of zero employee injuries, property damage and an environmentally friendly and sustainable workplace. The nine Life-Preserving Principles (S2-001-WI1), along with their descriptions, can be found on AECOM's Ecosystem (intranet).

Commitment:
Managers will lead on safety, continuously demonstrating commitment to the highest standards.

Participation:
All employees are encouraged to engage in helping to control the risks we face.

Budgeting and Staffing for Safety:
The costs of managing SH&E are budgeted into every project. Our safety staff are fully trained to provide expert guidance.

Pre-planning:
We assess risks and produce detailed plans to control them during design, planning, and execution of work.

Contractor Management:
We carefully select and collaborate with all our partners to create a safe working environment.

Recognition and Rewards:
Employees are rewarded for safety excellence, and we share best practices.

Orientation and Training:
Our employees will be provided with effective safety training in order to identify and mitigate hazards in the workplace to prevent injuries to themselves and others who may be affected by their actions.

Incident Investigation:
We investigate recordable incidents and serious near misses to understand the causes and take action to prevent recurrence.

Fit for Duty:
All staff come to work each day fit and well, so they do not pose a hazard to themselves or others.

12.4 Fitness for Duty

One of AECOM's nine Life-Preserving Principles is Fitness for Duty (see Fitness for Duty procedure (S3AM-008-PR1). Fitness for Duty means that individuals are in a state (physical, mental, and emotional) that enables them to perform assignments competently and in a manner that does not threaten the health and safety of themselves or others. On certain projects or for specific tasks, fit for duty certifications may be requested of medical providers by SH&E Managers or Human Resources (HR). Employees should ensure they are fit for duty prior to leaving home and unimpaired by substances or fatigue, and if necessary, contact your supervisor rather than attempting to report to work in unfit condition. Supervisors must observe their employees

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and work with the employee, SH&E staff, and HR to address deficiencies. AECOM will **NOT** tolerate retaliation against any employee for filing a complaint or concern regarding their fitness for duty or participating in any way in an investigation.

12.5 Proactive Health

AECOM is committed to promoting proactive health activities in addition to the planning for prevention of safety and environmental incidents. Proactive health activities will be completed on an on-going basis at AECOM on a corporate-wide basis (i.e., the wellness program associated with employee benefits), at offices, and at this project site. Management will be actively involved in providing and encouraging opportunities for health and wellness education and improvement. Health initiatives and education will be discussed periodically during office-based meetings as the safety moment or during the daily tailgate meeting as a toolbox talk. Topics may be related to, but are not limited to, the following:

- ✓ Heart health
- ✓ Stress management
- ✓ Smoking cessation
- ✓ Diabetes prevention
- ✓ Diet
- ✓ Exercise benefits

Topics and educational materials can be located on the AECOM Wellness page, National Institutes of Health website, Centers for Disease Control and Prevention website, and other reputable sources online.

In addition, the field team will be encouraged to participate in a daily stretch and flex routine (a standardized way to avoid soft tissue damage from work activities) to the best of their abilities, given their own personal limits. It is particularly beneficial to warm and loosen muscles before repetitive work, manual handling of loads, and when working in cold temperatures or with static postures. The Stretch and Flex manual and poster (**Attachment C**) serve as guidance for the leader to follow.

12.6 Fatigue

One aspect of fit for duty is fatigue management. AECOM has developed procedures that limit work periods or requires additional rest under certain circumstances, including during long-distance travel or when working at high altitudes. These procedures also set limits on extended work periods of 14 hours per day or 60 hours per week. A fatigue management plan is required if longer working hours are necessary (see Fatigue Management Procedure S3AM-009-PR1).

12.7 Driving and Vehicle Safety

The proper operation of vehicles is critical to protecting the safety of AECOM employees and subcontractors. Drivers face numerous hazards while operating vehicles. Some of the hazards include collision with another vehicle, collision with a fixed object, vehicle break down or failure, or falling asleep or becoming otherwise incapacitated while driving. All employees will adhere to Driving procedure S3AM-005-PR1, which includes the following key practices:

1. **Authorized Drivers**
   Managers must authorize drivers following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducting AECOM business.

2. Electronic Devices Prohibited
   AECOM prohibits use of all portable electronic devices while operating a motor vehicle/ equipment, which includes being stopped at a traffic light or stop sign. Electronic devices include, but are not limited to, all mobile phones, two-way radios, pagers, iPods, MP3s, GPS, DVD players, tablets laptops, and other portable electronic devices that can cause driver distraction. Hands-free device use is **NOT** allowed.

   - GPS units and devices used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Electronic devices shall be setup for operation prior to commencing driving activities and shall NOT be changed by the driver while driving.

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3. **Vehicle Inspections**
   The driver shall conduct pre-trip vehicle inspections prior to each trip. A vehicle inspection checklist, S3AM-005-FM2, can be used to guide and document the inspection process. Vehicle inspection is to include a 360-degree walk around and visual inspection under the vehicle for leaks and obstructions prior to moving the vehicle.

4. **Training**
   All drivers shall complete defensive driver training. Additional training (i.e., hands-on defensive driver training) may apply for medium and high-risk drivers; see Driving procedure S3AM-005-PR1 and SHE Training procedure S3AM-003-PR1 for more details.

5. **Journey Management Plan**
   Drivers who undertake trips in excess of 250 miles (400 kilometers) one way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a Journey Management Plan using S3AM-005-FM1 or equivalent.

6. **Secure Loads**
   Cargo is only to be carried within the passenger compartment of a vehicle when segregated and restrained to prevent objects from becoming distractions, obstructions, or projectiles to occupants should emergency vehicle maneuvers be required (e.g., harsh braking or crash). All goods transported on flatbed trucks or in pickup beds must be securely fastened to prevent them from becoming hazards. All applicable laws and regulations regarding securing of loads must be met. It is prudent to check the load after a few miles to ensure that load has not shifted or loosened prior to completing the remainder of the trip.

12.8 Fatigue and Driving Safety

The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

- ✓ After strenuous fieldwork, consider overnight accommodation or vehicle sharing for staff who are not acclimatized to the type of work.
- ✓ Microsleep can occur with a limited warning, and may be linked to several factors, for example:
  - Microsleep is most likely to occur during times when the circadian rhythm dictates the body should be asleep, such as at dawn, late at night, or in the mid-afternoon (e.g., 1 and 4 am and 1 and 4 pm.).
  - Potential to feel drowsy after a meal.
  - Driving long distances (considered potentially monotonous) even with sufficient sleep.
  - Prolonged sitting and warm ambient temperature may also increase the feeling of sleepiness.
- ✓ If safe to do so, consider undertaking actions to disrupt the microsleep event while identifying a safe place to stop, e.g., open a vehicle window, listen to upbeat music/change music source, or ask the passenger (if present) to engage in conversation.
- ✓ Ensure field staff are familiar with the signs of fatigue and mitigation factors.

The most common visible signs of microsleep include the following:

- Eyelid drooping
- Eyelid closure
- Head nodding
- Brief periods of snoring
- Wandering thoughts

If any of the above become apparent, immediately pull over to a safe location and contact your PM or SH&E representative.

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12.9 Hand Safety

The hands are exposed to hazards more than any body part. SH&E Hand Safety Procedure S3AM-317-PR1 describes requirements and best practices including these notable practices:

- **All personnel shall have gloves in their immediate possession 100%** of the time when in a shop or on a work site. Gloves that address the hazard shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc. Use the Gloves Needs Assessment (S3AM-317-FM1) to help determine the appropriate glove for the hazard(s).
- **Fixed open-blade knives are prohibited** from use during the course of AECOM work. Examples of fixed open-blade knives include pocket-knives, multi-tools, hunting knives, and standard utility knives. For more information about cutting tools, see S3AM-317-ATT1 Safe Alternative Tools.

12.10 Substance Abuse

Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment, and facilities. AECOM is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable. AECOM Substance Abuse Prevention Procedure (S3AM-019-PR1) prohibits the use, possession, presence in the body, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises. Company premises refer to all property, offices, facilities, land, buildings, structures, fixtures, installations, aircraft, automobiles, vessels, trucks and all other vehicles and equipment - whether owned, leased, or used.

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood- or mind-altering substances, and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances; and
- Alcoholic beverages while at work or while on any customer- or AECOM-controlled property.

This policy does not prohibit lawful use and possession of current medication prescribed in the employee's name or over-the-counter medications. Employees must consult with their health care provider about any prescribed medication's effect on their ability to perform work safely and disclose any restrictions to their supervisor.

Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution, and possession of marijuana are violations of federal law and AECOM policy and will subject an employee to disciplinary action up to and including termination in accordance with controlling law. In Canada, where medical and recreational marijuana use is legal, employees must still follow Federal and Provincial laws, and AECOM policy with regards to use and possession. Employees found to be in contravention of legal requirements or AECOM policy will be subject to disciplinary action up to and including termination.

12.11 Rewards and Recognition

One of AECOM's Life Preserving Principles is Recognition and Rewards for proactive safety, health, and environmentally focused behaviors. All projects are expected to participate in the rewards and recognition programs available on the Corporate and DCS Americas SH&E ecosystem pages. Large, long term projects are encouraged to establish a project specific rewards and recognition program which incorporates project specific goals and activities (template available S3AM-020-FM1). ***All rewards and recognition programs must emphasize the 9 Life Preserving Principles and proactive SH&E activities NOT solely the achievement of lagging metrics ("injury/incident-free" hours, etc.) as those may discourage incident reporting.***

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12.12 Stop Work Authority

AECOM empowers and expects all employees to exercise their Stop Work Authority (see Stop Work Authority Procedure (S3AM-002-PR1) if an incident appears imminent, or when hazardous behaviors or conditions are observed. A stop work request can be informal if the situation can be easily corrected or may require shutting down operations if revised procedures are necessary to mitigate the hazard. If an AECOM employee observes an imminently hazardous situation on a site controlled by others (i.e., a client-managed contractor), the employee can always stop work for themselves by removing themselves from the situation. Employees also may attempt to stop work to avoid allowing the contractor to come to harm by immediately notifying the contractor foreman or site engineer, or if necessary, the client or party managing the contractor.



No employee should object to the issuance of a stop-work request, nor can any disciplinary action be levied against the employee. All employees must agree that the situation has been mitigated before resuming work. No employee will be disciplined for refusing to work if they feel it is unsafe.

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13. Roles and Responsibilities

13.1 AECOM Project Manager

The AECOM Project Manager (PM) may delegate responsibilities to an AECOM Deputy PM or AECOM Task Manager (TM) with equivalent competencies. The AECOM PM is responsible to:

- Understand the scope, performance standards, objectives, and applicable AECOM and bp requirements and expectations,
- Ensure the workforce, including subcontractors, is aware of the project scope and objectives, and the associated performance standards, requirements, and expectations,
- Verify that the full scope of work has been risk assessed with Task Hazard Assessment (THA) prepared, reviewed, and approved for each task,
- Authorize the start of all work tasks/activities within area of responsibility,
- Assign competent Crew Leaders, Permit Issuers/Approvers, and Persons in Charge as appropriate for the project scope of work,
- Be knowledgeable of and participate, where needed, in permit development and verification of the necessary work permits, and
- Verify that work activities are consistent with the policies and procedures.

13.2 AECOM Site Supervisor

The Site Supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans and HASP. The Project Manager may act as the Site Supervisor while on site. The Site Supervisor's responsibilities include:

- Verify the personnel, equipment/machinery and instruments anticipated to mobilize to site.
- Communicate project roles and responsibilities.
- Discuss planned activities for the day and any potential simultaneous operations (SIMOPs).
- Establish staging and work areas for planned activities.
- Confirm crews have reviewed and updated, as necessary, task hazard assessments prior to beginning the task.
- Coordinate and document project activities.
- Monitor for deviations and changes in scope, personnel, methods, materials, equipment/machinery, instrumentation, and site conditions.
- Notify the AECOM project manager of changes and coordinate change management.
- Escort or delegate the escorting of site visitors.
- Serve as AECOM's point of contact with the host facility and person-in-charge for simultaneous operations (SIMOPs).
- Delegate stop work authority to all project employees and report all unsafe acts/behaviors and conditions, near misses and incidents to the AECOM project manager.
- Lead by example – walk the talk.

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13.3 AECOM Site safety lead

The Site safety lead supports the Site Supervisor in providing a safe work environment. Not all sites will have a designated Site safety lead; the decision should be made by the Project Manager and SH&E Manager taking into consideration the complexity and risks of the scope of work. The Site Supervisor may act as the Site safety lead on sites without one. The Site safety lead's responsibilities include:

- Conduct the site safety orientation for the entire field team, including subcontractors, and site visitors.
- Lead the tailgate safety meeting.
- Discuss hazards present at the site and/or within environmental media and their control measures.
- Communicate air monitoring methods and action levels.
- Explain emergency response and reporting procedures, including emergency contacts and muster and shelter-in-place locations.
- Establish exclusion and contamination reduction zones, as needed.
- Verify SWP/HASP, THA and safety requirements and expectations are being met.
- Confirm hazard control measures are in-place and effective.
- Perform housekeeping and site inspections to ensure a safe working environment.
- Engage outside safety, health & environment resources, as needed, to allow for the safe performance of the work.
- Assist in incident investigations and identification and implementation of corrective actions.
- Lead by example – walk the talk.

13.4 AECOM SH&E Manager

Responsibilities of the SH&E manager is to:

- Promote the AECOM Safety for Life Program and our Nine Life Preserving Principles.
- Understand the application of SH&E regulatory requirements relevant to SH&E in the company's operations and be aware of changes in regulations which may affect the company.
- Be formally trained, licensed, or certified where the regulations require.
- Assist with the budgeting and staffing process to ensure project teams have the knowledge and resources needed to perform their work safely.
- Be aware of all incidents, near misses, observations, unsafe acts, and unsafe conditions that are reported and participate in the investigation process where required.
- Verify incidents are reported to regulatory bodies in accordance with local legislation.
- Review investigation findings to confirm identified corrective actions are appropriate and subsequently implemented.
- Review and accept site-specific SH&E Plans and Task Hazard Analyses (THAs).
- Assist in the preparation of risk assessments.
- Assist in the review of SH&E training needs.
- Verify necessary training as required by AECOM policies and procedures and/or the regulations.
- Assist in the setting of SH&E expectations at project level and review them periodically.
- Perform project SH&E audits on a periodic basis.
- Monitor the corrective actions taken, where audits identify non-conformance or opportunities for improvement, for confirmation of their completion and effectiveness.
- Lead by example, walk the talk.

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13.5 AECOM Workforce

The workforce members play an important role in safety. Each workforce member shall:

- Comply with the host facility, client, and AECOM requirements for their assigned tasks and the site.
- Have the appropriate training/competencies to complete their assigned task(s) safely and efficiently.
- Participate in risk reviews and/or THAs and provide input to ensure that the full scope of work, associated hazard, and their control measures have been adequately addressed to allow for the work to proceed safely and efficiently.
- Conduct appropriate work area and equipment inspections prior to work activities.
- Assist in identification of work process deficiencies and recommend possible improvements if applicable.
- Remain focused and aware of surroundings while on the jobsite to changes that may impact ability to perform job task or affect the safety of other team members.
- Understand the Emergency Response Plan (ERP) and be able to respond as it directs per the assigned role.
- Stop work, intervene (Speak Up, Listen Up), and report all observed unsafe work activities, unsafe site conditions, and any incidents with or without (near miss) consequences.
- Upon request, participate in incident investigations and/or re-enactments.

13.6 Visitors

Authorized visitors (e.g., client representatives, regulators, AECOM management staff, etc.) requiring entry to any work location on the site will be briefed by the Project Manager, Site Supervisor, or Site safety lead on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and PPE that are required for entry to any controlled work area; visitors must comply with these requirements at all times.

If the site visitor requires entry to any exclusion zone (EZ), but does not comply with the above requirements, the visitor will be denied access to the EZ. If the visitor disregards instructions to remain outside the EZ, work activities will be immediately suspended, and the situation reported and documented.

Unauthorized visitors, and visitors not meeting the specified qualifications, will **NOT** be permitted within established controlled work areas. If unauthorized visitors and/or visitors not meeting the specified qualifications enter a controlled work area and/or EZ, work activities will be immediately suspended, and the situation reported and documented.

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14. Subcontractor Management

14.1 AECOM Roles/Responsibilities for Sub Management

When managing an AECOM Subcontractor of any tier, AECOM management and supervision will follow the requirements in S3AM-213-PR1 and are responsible for the following:

- Direct all activities of the facility, site, or project location.
- Ensure appropriate training and experience of AECOM personnel responsible for overseeing subcontractor work.
- Verify subcontractors have the appropriate trained and competent personnel to perform their activities in a safe, healthful, and environmentally responsible manner.
- Pre-qualification of Subcontractor – Prior to performing work on an AECOM project, management and supervision must verify the Subcontractor has been pre-qualified. AECOM's preferred method of prequalification in Coupa, but there are other ways to prequalify a subcontractor.
- Ensure all subcontractor employees attend the AECOM daily tailgate safety meeting.
- If you have any questions about subcontractor pre-qualification, reach out to an AECOM SH&E professional.

14.2 Subcontractor Roles/Responsibilities for Safety

Subcontractors must provide AECOM with a designated Subcontractor Safety Representative (SSR). Their responsibilities are as follows:

- Direct employees' means and methods of work and how to work safely.
- Be knowledgeable of and understand the safety requirements of the subcontractor's activities.
- Staff the project with employees that are trained and knowledgeable of the tasks they will be performing.
- Have the ability to recognize hazards and the authority to take prompt corrective actions.
- Implement the subcontractor safety program.
- Serve as the direct contact with AECOM regarding resolution of SH&E issues.
- Immediately report all work-related injuries/illnesses/incidents, environmental incidents, and regulatory inspections/violations to AECOM according to AECOM procedures and/or client requirements.

14.3 Subcontractor HASP/THAs

If the subcontractor's scope of work includes hazards that are not covered by the AECOM Health and Safety Plan (HASP), the subcontractor will need to provide AECOM with their site-specific HASP and task-specific Task Hazard Analyses (THAs). All subcontractor procedures must at a minimum comply with client and AECOM requirements to ensure that hazards associated with the performance of their work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to AECOM for review prior mobilization to the site.

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15. Training and Documentation

The following sections describe the standard practices or programs that AECOM will establish to prepare employees to perform work safely and consistent with AECOM policy and Procedures. For additional information on SH&E Training, review the Safety, Health and Environment Training, S3AM-003-PR1.

15.1 HASP/Site Safety Orientation

The Project Manager shall conduct a project/site-specific HASP orientation prior to the start of field operations, with support as needed by the SH&E Manager, Site safety lead, or Site Supervisor. This meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site. Minimum items to be covered are listed in **Attachment D**. Participants will then sign the HASP Personnel Acknowledgement register at the end of the HASP.

15.2 Worker Training and Qualifications

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure S3AM-003-PR1 establishes the general training requirements for AECOM employees.

See **Section 8.1** of this HASP for site-specific required safety training and documentation.

15.3 Competent Person(s)

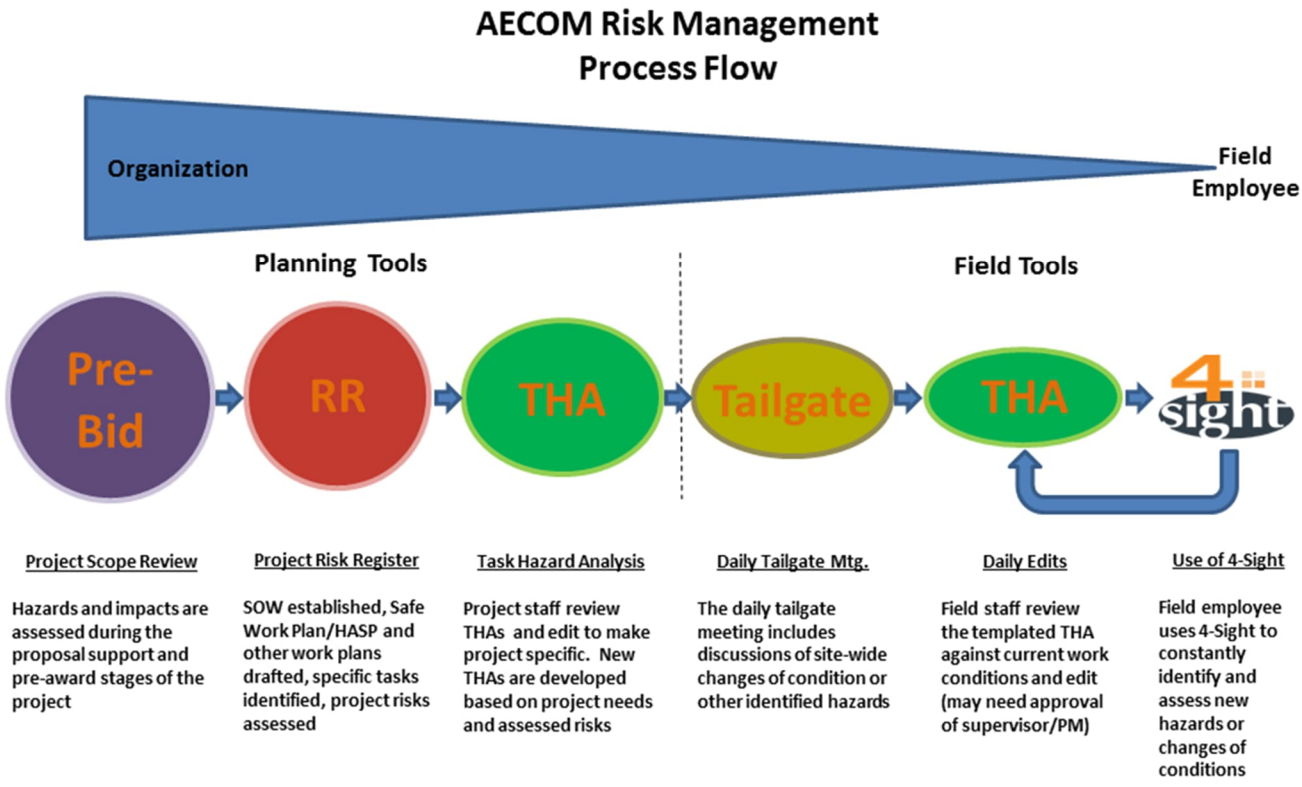
A competent person is an employee who, through education, training, and experience, has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

AECOM's Competent Person Designation Procedure, S3AM-202-PR1, explains the roles, responsibilities and procedures of naming a competent person. Review **Table 5-3: Competent Person Log** of this HASP for a list of site-specific competent person(s) required for this scope of work.

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16. Hazard Assessment and Control

AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and AECOM operations. See S3AM-209-PR1, Risk Assessment and Management, for details regarding AECOM's process. This approach is illustrated below and described in the following section.



AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and AECOM operations. See S3AM-209-PR1, Risk Assessment and Management, for details regarding AECOM's process. This approach is illustrated below and described in the following section.

16.1 SH&E Procedures

All AECOM SH&E procedures, in their controlled copy version, are available on the internal SH&E Policy and Procedures ecosystem page. Programmatic procedures referenced in this document (for example SH&E Training) do no need to be printed for inclusion in this HASP. The applicable field procedures checklist is in the Physical Hazards section below and procedures are included in **Attachment B**.

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16.2 Task Hazard Assessments and Daily Tailgate Meetings

THA forms (a blank version is located in S3AM-209-PR1) shall be prepared for each task to be performed as part of the scope of work. This includes driving to the site, parking, and walking as well as the hazards, associated risk, and appropriate controls for all other work activities. The DCS Americas Templated THA Library may also be used to find previously approved THAs, though these should be modified to be project and site-specific. The preparer shall have one THA form for each task in the Scope of Work found in this work plan (**Attachment A**) and shall also include blank copies.

In the field, all employees and visitors shall review the daily THAs and conduct and attend the daily tailgate meeting. When employees arrive on site, conditions may be different than originally planned or additional job steps may be required. The THA requires workers to update or 'dirty up' the THA in the 'On-Site Edits' rows to assess the risks presented by the changed condition(s) and requires the worker to describe steps to reduce the risk. If the hazard(s) cannot be successfully mitigated, the work will **NOT** proceed.

A Site safety lead (SSL) or field supervisor shall conduct a daily tailgate meeting to review the specific requirements of this HASP prior to the commencement of daily project activities. Attendance at the daily tailgate meeting is mandatory for all employees and subcontractors at the site covered by this HASP. Simultaneous operations are encouraged to attend each other's tailgate meetings or at the very least the supervisors shall discuss the coordination of activities and associated hazards of each other's tasks. The tailgate meeting must be documented by the field Supervisor or SSL, using the New Daily Tailgate Meeting App. Use the appropriate QR code to download the App and/or go to the Daily Tailgate Meeting App Ecosystem page for details, guides, training sessions and/or other information:



iOS

Android

As an alternative you can also use or the Daily Tailgate Meeting form (S3AM-209-FM5), a blank copy of which is included in **Attachment A**.

16.3 Hazard Categories

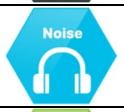
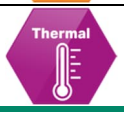
THAs should include consideration of the following hazard categories when identifying hazards and task specific controls:

Table 16-1: AECOM Hazard Categories

Category	Definition
	A biological hazard is any living organism that could cause irritation, allergic reaction, bites, stings, illness, infection, or other injury.
	A chemical hazard is any chemical substance that could potentially cause harm to humans, equipment, or the environment either through contact, ingestion, absorption, inhalation, or reaction.
	Electrical hazards are present whenever there is potential for contact with an electric charge.

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Table 16-1: AECOM Hazard Categories

Category	Definition
	Gravitational force can cause tools, equipment, materials, and people to fall either to the same level or from heights to the earth or a lower surface.
	A mechanical hazard when there is energy within the components of a mechanical system within an otherwise stationary piece of equipment/machinery.
	Objects or substances that can move or are moving not due to gravity create a motion hazard. Motion hazards also include body motions and positioning such as bending, stretching, kneeling, etc.
	Noise hazards are sounds that may prevent effective communication or cause hearing loss.
	Any physical matter such as gases, liquids, and springs that is compressed or under a vacuum creates a pressure hazard.
	Radiation hazards include both ionizing and non-ionizing energy emitted from radioactive elements or sources.
	Thermal hazards can cause injury or damage due to their temperature.

16.4 4-Sight

When preparing hazard assessments and throughout the day workers should use 4-Sight. This is a mental process through which workers ask themselves (and each other) four questions designed to effectively assess hazards. Using these questions during each task, especially those without established THAs, will help workers identify hazards and condition changes so that they can control them or stop work to seek assistance.



- What am I about to do?
- What could go wrong?
- What could be done to make it safer?
- What have I done to communicate the hazard?

16.5 Speak Up/Listen Up

All AECOM employees have a responsibility to help create the environment where the expectation is Safety for Life. Speak Up/Listen Up (SULU) is a technique to steward jobsite safety by utilizing 4-Sight as a basis for safety feedback conversations. SULU has two main parts:

- **Speak Up** where employees use three simple steps when providing feedback to others about unsafe acts:
  - Ask to discuss their hazard assessment or 4-Sight for the task;
  - Get a commitment from the employee to apply the hazard controls and perform the task according to the accepted procedures; and

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  - Follow up to ensure the employee is working safely.

- **Listen Up** where employees use two simple steps when responding to safety feedback:
  - Listen – Focus on the message, not the messenger; and
  - Commit to performing the task the safer way.

SULU conversations should happen consistently throughout the workday to create clear expectations of how work should be performed. All employees should recognize safe work behaviors in order to reinforce them and keep them going. An occasional correction is much more effective when employees are frequently encouraged and positively recognized for their safe actions. Managers and supervisors should be having SULU conversations during site visits and ensure peer to peer and site supervisor to crew SULU conversations are being held.

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17. SH&E Event Reporting & Investigation

17.1 Incidents and Near Misses

All incidents and near misses (i.e., incidents without consequences), regardless of type and perceived severity, must be reported in accordance with the Incident Reporting, Notifications and Investigation, S3AM-004-PR1 and entered into **IndustrySafe** (AECOM's SH&E Database) within the timeframes listed below:

Table 17-1: Incident Reporting Timeframes

Incident Type	IndustrySafe Reporting Timeframe
Significant Incident, including any injury to an AECOM employee or Subcontractor	Within **4 hours**
All Other Incidents	Within **24 Hours**

17.2 Investigation

All incidents and near misses will be investigated and documented to determine the contributing and root causes. The investigation will verify the need for corrective actions and identify opportunities for Lessons Learned and continuous improvement. For more information in incident investigations, please review the Incident reporting, Notifications and Investigation procedure, S3AM-004-PR1.

As soon as it is safe to do so after an incident occurs, the following information will be gathered:

- An incident timeline;
- Witness statements;
- Photos of the incident;
- Police reports, if applicable;
- Any additional information that will assist in the investigation; and
- Copies of daily safety documentation and/or field notes.

Note: Only the basic facts, who, what, when, where and how, are needed to complete the initial IndustrySafe report. SH&E Managers will assist you in updating the report as additional information becomes available.

17.3 Audits & Inspections

Safety audits and inspections at the project level can occur at any stage in the project lifecycle. Audits and inspections can focus on AECOM, subcontractors, or both. Audits and inspections may be performed by Project Managers, Operations Management and SH&E Managers. Virtual or in-person (field) audits and inspections may be performed. Several checklists are available to guide the evidence-based audit and inspections. Audits and inspections will be documented in one of AECOM's SH&E databases along with any corrective actions. The database will be used to track corrective actions to completion. For more information on audits and inspections, please review the Compliance Assurance procedure, S3AM-216-PR1. The following checklists are available to guide audits and inspections:

- **Senior Management Activities (SMAs)**
- **Project Safety Reviews (PSRs)**
- **Site Safety Inspections (OSHA Type**
- **Healthy Starts / Project Risk Reviews**
- **Subcontractor SH&E Performance Assessment (S3AM-213-FM3)**

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- **Environmental Compliance Assessment Checklist (S3AM-204-FM1)**

External Regulatory Inspections – If a regulatory inspector shows up on site. **STOP WORK** and contact your Project Manager and SH&E Manager. AECOM will follow the requirements in our Regulatory Inspections procedure S3AM-211-PR1.

17.4 Safety Observations

All safety observations must be entered into **IndustrySafe™ or Lifeguard™** (AECOM's SH&E Databases).

17.5 SH&E Database Access

Incidents, near misses, and audits/inspections must be entered into **IndustrySafe™**, which is one of AECOM's SH&E Databases. Safety observations may also be entered into **IndustrySafe™** at the AECOM Project Manager's discretion. **IndustrySafe™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. IndustrySafe may also be accessed from your smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.

Incidents, Near Misses, Audits/Inspections and Safety Observations

Safety observations may also be entered into **Lifeguard™**, which is one of AECOM's SH&E Databases, at the AECOM Project Manager's discretion. **Lifeguard™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. **Lifeguard™** may also be accessed from your smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.

17.6 Reporting Assistance

If your field schedule, access to internet, and/or limited cellular phone coverage have the potential to impact timely incident, near miss, and/or safety observation reporting, please contact your AECOM Project Manager and/or SH&E Manager for assistance.

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18. Environmental Management

18.1 Scope

AECOM implements policies and procedures to reduce risk of land and/or water pollution and other environmental concerns during the life of the project. The AECOM Project Manager will ensure compliance with all local, state, federal and client environmental laws and/or regulations. For additional information on Environmental Management, please review the Environmental Compliance procedure, S3AM-204-PR1.

18.2 Roles and Responsibilities

All AECOM staff through the leadership of the AECOM Project Manager are responsible for reducing or eliminating environmental impacts by AECOM personnel. The site supervisor and/or the Site safety lead will be immediately notified of any spills, leaks, or other impacts to the ground and/or water, or other environmental emergencies, after emergency respondents have been called, if necessary. The Project Manager will be responsible for making any further notifications as required.

18.3 Staffing and Awareness

AECOM staff will receive relevant awareness training to ensure proper knowledge and training when performing activities with the potential to impact the environment, as well as the requirement of this plan for proper preparedness and response.

18.4 Pollution Prevention

Pollution/impact to the environment could be caused by the following sources:

- Air emissions
- Wastewater
- Hazardous materials
- Solid waste
- Hydrocarbons
- Storm water and sediment/erosion

AECOM will employ prevention and control measures to prevent impacts to the environment. In addition, a spill kit consisting of sorbent socks, pads, shovels, and personal protective equipment (PPE) will be maintained on site by AECOM and each subcontractor. Solid waste will be collected, segregated (recyclable, non-flammable, and flammable) and removed on a regular basis.

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19. Project Closeout

Completing a project requires procedures to close out Project Contractual and Administrative activities. The closeout process ensures all documentation is finalized and any Contractual Obligations are met. The Project is ready for close-out once it has been accepted by the end user organization. Project close-out is complete after all physical, regulatory, contractual, and financial close-out activities are complete.

19.1 Health and Safety File

The Health and Safety File will normally include:

- Brief description of the work carried out.
- Residual hazards which remain and how they have been dealt with (e.g. surveys, or information on asbestos, contaminated land, water bearing strata, buried services etc.).
- Key structural principles incorporated in the design (e.g. bracing) safe working loads etc.
- Any hazards associated with the materials used.
- Nature, location, and markings of significant services including underground cables, gas supplies, firefighting etc.
- Information and ‘as built’ drawings including safe access to and from confined spaces etc.
- Daily Tailgate Meeting Forms
- Lessons Learned

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20. Personal Acknowledgement

By signing below, the undersigned acknowledges that he/she has reviewed the AECOM Health and Safety Plan for the Town of Hurley Landfill site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work and will comply with the provisions contained therein. The employee understands that they are **NOT** to perform any work that they have not been adequately trained for and that they are to stop work if it is unsafe to proceed. Finally, the employee understands to notify the Site Supervisor and the **Incident Hotline at 800-348-5046** for any incident, ***including ANY injury even if no first aid or medical treatment is required.***

Print Name Clearly	Signature	Organization	Date

20.1 Disclaimer

This HASP, and each of its provisions, is applicable only to, and for use only by, AECOM, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third-party contractors on industrial sites or projects where AECOM is providing engineering, construction management, or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM Corporation shall have no responsibility. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.

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Attachment A

THA Forms, and Tailgate Safety Meeting Form

Attachment A: THA Forms, and Tailgate Safety Meeting Form

Task Hazard Assessment Instructions:

Each unique task or work group should have their own THAs. If workers have a THA for their task(s) in hand, they should simply review it and document the site-specific edits in the appropriate section. If workers do ***not*** have a THA for all tasks to be performed, a THA must be obtained or drafted *prior to starting work* on that task. Use additional pages as needed.

- Identify the basic steps of the task that must be performed in order and their associated hazards. Identify controls or barriers to mitigate each identified hazard.
- Clearly identify any **STOP WORK** triggers.
- Document stop work and change management if conditions/ scope changes.
- Use 4-Sight to identify and mitigate site-specific hazards throughout the day. Modify the THA as needed. Contact site supervisors or the PM for any significant scope changes or changes of expected conditions.
- All THAs shall be 3 pages (maximum) or less (preferred). If they are longer, the task is too broad.
- All hazards will use standardized nomenclature (Hazard Wheel), should be specific, detail how someone could be hurt and what the outcome could be.
- All actions to mitigate hazards must be specific, clearly aligned with its respective hazard and not generic. Avoid words such as "*proper", "correct*", or "*appropriate*"). Use specifics and numerical values (i.e., wear disposable nitrile gloves, stand back 6 feet/1.8 meters, take a 10-minute break every hour).
- PPE cannot be the only line of defense - PPE is always the last line of defense, so think through what other controls (engineering, administrative, etc.) could mitigate hazards.

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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Biology – Biological Monitoring / Survey	**Control #:**	01-01-06-09

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☐ Safety Toe Boots ☐ Gloves: Cut resistant ☐ Hearing Protection ☐ Other:
Tools & Equipment:	iPad Camera GPS

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Site Inspection	1a. Injury from slips, trips, falls while taking photos of existing conditions	3	1a. Be attentive and aware of surroundings while inspecting the property for biological resources. Be aware of footing and walking surfaces.	2
	1b. Contact with poisonous plants	6	1b. Wear required clothing for work environment and be trained in poisonous plant identification. If identified in immediate work area – **STOP WORK** and communicate the identification of poisonous plants to team and PM.	3
	1c. Infection, allergic reaction, or irritation from biting/stinging insects	4	1c. Wear required clothing for work environment. Tuck / tape pants into boots and use insect repellant (DEET and/or Permethrin).	2
	1d. Broken bones due to contact with vehicle in urban/highway settings	**10**	1d. Use beacons for vehicles if stopped frequently, use traffic cones if stopped on the side of the road, be aware of traffic conditions, speed, etc. Wear high-visibility PPE to be visible depending on proximity to the road	4
	1e. Injury/infection from contact with wildlife	4	1e. Ensure the required training in relevant wildlife related threats (bear, rattlesnake, etc.), be aware of surroundings, geography, and wildlife species within the site area.	2
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name: Biology – Biological Monitoring / Survey	**Control #:**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
2. Pedestrian Survey/ Monitoring	2a. Injury from slips, trips, falls while walking in the field	3	2a. Be attentive and aware of surroundings while walking. Be aware of footing and walking surfaces. Do not walk and use telephone, GPS, camera, etc.	2
	2b. Rolling an ankle in field	4	2b. Wear boots with ankle support. Be aware of footing and walking surfaces.	2
	2c. Injury to body or eyes from walking through thick vegetation	3	2c. Wear required clothing (long sleeve shirt) to prevent scrapes on arms and legs. Wear safety glasses in dense vegetation to prevent branches from hitting your eyes.	2
	2d. Heat stress	4	2d. Know the signs and symptoms of heat stress (refer to the procedure S3AM-113-PR1 for information). Set schedule for breaks. Have adequate drinking water available and drink frequently. Arrive at the site well hydrated and physically fit.	2
	2e. Cold stress	4	2e. Know the health concerns associated with working in cold weather including hypothermia, frost bite, etc. (see S3AM-112-PR1). Set schedule for breaks. Dress in layers.	2
	2f. Burns to exposed skin due to contact with sun (Sunburn)	4	2f. Have sunblock available and apply and reapply as per directions. Avoid direct solar exposure when possible. Seek breaks in shaded areas. Cover exposed skin (neck).	2
	2g. Adverse health effects while conducting night surveys (slip/trip/falls, personal security, getting lost, fatigued…)	6	2g. Carry flash lights with back up batteries, have communication protocols in place in case you get lost, inform land owners prior to surveys to prevent confrontations. Inspect site during the day to get lay of the land before night fall.	3
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Biology – Biological Monitoring / Survey	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

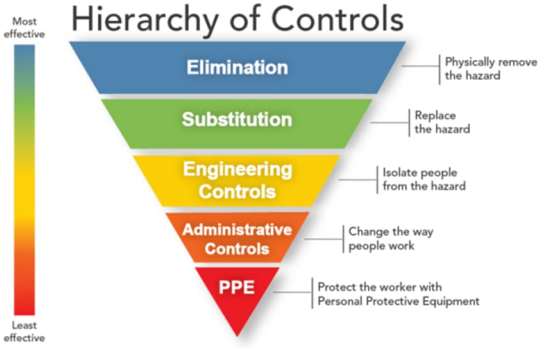
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	DRILLING, GROUTING, MONITORING WELLS	**Control #:**	01-01-03-07

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd., West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile ☒ Hearing Protection ☐ Other:
Tools & Equipment:	Cutting tools, Hot Work Permit

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Pre-mobilization, Equipment Inspection. Contact One-Call, private utility contractor, and/or site personnel to locate and mark underground utilities.	1a. Injury from equipment malfunction	5	1a. Ensure that PM or person responsible for scheduling rental equipment requests that the vendor inspects the equipment prior to site delivery to ensure all appliances are in working order and fit for use.	4
	1b. Failure to have underground utilities identified could result in explosion, electrocution, injury, death, property damage.	**10**	1b. Call public utility locating service prior to initiating work activities. Use private locating service to mark out areas on private property. Verify location of utility marks; do not perform intrusive work if utility location marks cannot be found or if marks are destroyed. Preserve utility marks as much as possible. Call to have utilities remarked if unsure as to their location. Complete utility checklist form.	4
On-Site Edits:				
2. Setup Drill Rig and work zone	**2a**. Struck by vehicle or equipment traffic	8	**2a**. Verify that drilling contractor inspects equipment daily using S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection or equivalent. Verify that kill switch on rig is tested and operational. Establish work zone using traffic control devices, signs, cones, etc. in advance of initiating monitoring well abandonment activities. Restrict access to observers and passersby.	4
	2b. Sprain or broken bones due to slip, trip or fall	6	**2b**. Maintain required housekeeping in work area, do not carry equipment where visibility of ground is impaired, remove or mark all trip hazards in work area.	2
	2c. Struck-by, crushed-by, caught-by drill rig.	**10**	**2c**. Communicate path of movement to all project personnel. Establish and use agreed upon hand signals during spotting activities. Always use a spotter(s) to direct movement of drill rig and watch for vehicle and pedestrian traffic. Additional spotter(s) will be used in	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Drilling, Grouting, Monitoring Wells	**Control #:**	01-01-03-07

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			high traffic areas and in areas with blind spots where traffic is difficult to observe. Chock wheels ensure outriggers/jacks are used.	
	2d. Contact with overhead utilities.	10	**2d**. Keep a minimum of 15 feet from overhead power lines (20 ft. if 230-285 KV, 25 ft. if 285-345 KV, 35 ft. if 345-500 KV) Check HASP to ensure client/site does not have stricter requirements. Mast shall be down when rig is in motion.	4
	2f. Hydraulic failure causing release to the environment.	10	**2f**. Place secondary containment on ground under rig. Ensure that secondary containment is setup with 'berms/barriers' or containment is securely clipped onto the rig tracks/wheels to protect from any fluid leaking off the plastic.	3
On-Site Edits:				
3. Commence drilling	**3a.** Cuts, contusions or broken fingers due to contact with moving parts	6	**3a**. Never place hands, fingers, feet under the bottom of an auger flight, or other location where these heavy items could be set down or could fall suddenly.	2
	3b. Entanglement	10	**3b**. Ensure rotating parts are properly guarded. Remove loose clothing and jewelry that could become entangled in moving parts. Use a long handled shovel to remove cuttings from the auger/rods.	4
	3c. Noise	6	**3c.** Wear hearing protection while equipment is in use.	2
	3d. Back strain/ overexertion when unloading equipment	8	**3d.** Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds.	4
	3e. Contusions to face or eyes due to flying/shattering objects	8	**3e.** Have bystanders maintain a 5 foot distance from the operation at all times. Set up work area the mast plus 5 feet and no less than 30 feet. Wear all required PPE.	4
	3f. Hand positioning/pinch points	8	**3f.** Wear leather or thick puncture-resistant gloves, communication between driller, helpers, and logger. All pinch point hazards should be labeled on rig with warnings.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Drilling, Grouting, Monitoring Wells**	**Control #:**	**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
4. Inspect grout mixer/pump	**4a.** Personnel, property, and/or equipment damage due to failure to inspect mixer/pump properly	6	**4a.** Read start-up and shutdown procedures shown on grout mixer/pump or read operating manual that accompanies unit. Check all fluid levels if equipped with gas engine. Be familiar with how to shut off mixer/pump in case of an emergency. Check that unit has adequate amount of fuel in the tank. Check all hydraulic hoses and fittings for leaks, wear, and proper connection. Ensure all guards are in place.	2
	4b. Skin irritations or labored breathing due to contact with with fuel	3	**4b.** Never overfill tank due to fuels expanding when heated. Make certain that fuel cap is fastened tight. Wear nitrile gloves underneath leather gloves during inspection	1
On-Site Edits:				
5. Grouting, Installing Well Pad	5a. Exposure to cement dust and mixed cement, skin, eye, and inhalation	6	5a. Wear a dust mask to protect against airborne particles. Wear leather gloves when adding materials to mixing tank. Open bags of dry materials in a controlled manner to minimize dust. Try to stay upwind from grout mixing.	2
	5b. Injury from entanglement in drive shaft or mixing paddles	6	5b. Do not reach into the mixing tank during operation. Do not wear loose clothing or use tools that could become entangled in drive shaft or mixing paddles. Turn the unit off before attempting to service the mixer or clear debris.	2
	5c. Splashes and spills	4	5c. Wear face shield to guard against splashes. Add water or other liquid additives in a controlled manner to avoid splashes. Do not exceed the capacity of the mixing tank	1
	5d. Muscle strain	9	5d. Stage bags of dry materials as close to mixer as possible. Use a buddy to help move heavy bags. If possible, lower the height of mixer to minimize lifting.	3
	5e. Hand injury from opening bags on breakers. Pinch points.	6	5e. Wear leather gloves when placing bags of dry materials onto bag breakers. Do not place hands between heavy bags and the bag breakers.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Drilling, Grouting, Monitoring Wells**	**Control #:**	**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	5f. Cuts or contusions to hands, fingers from assembling well frame	8	5f. Wear cut resistant gloves at all times and watch hand placement to avoid sharp edges and pinch points. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	4
On-Site Edits:				
6. Debris handling and disposal	6a. Cuts and abrasions and pinch points during debris handling	6	6a. Note pinch points and sharp edges on concrete, well vaults, protective casings, metal skirts, and bollard debris and avoid. Don leather gloves	4
On-Site Edits:				
7. Environmental Concerns while on site	7a. Inclement weather	**10**	7a. Check weather forecast daily, have appropriate clothing and gear for weather conditions	6
	7b. Hypothermia	**10**	7b. Discuss symptoms of hypothermia before deployment. Have a means of warming (hot liquids, hand warmers, etc., and a set of dry clothing, etc. available on the vessel. Change into dry clothing if you become wet at cold temperatures.	5
	7c. Heat stress/heat illness	6	7c. Provide drinking water and electrolytes. Have a heat stress control plan (including shelters, work rotation, methods of cooling). Review prevention, symptoms and treatment guidance before deployment.	4
	7d. Sunburn	8	7d. Wear sunscreen and hat, prevent as much solar exposure as possible	5
	7e. Biological Hazards	6	7e. Assess work area for poisonous plants and communicate observations to avoid them. All field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants oils and inspects. If contact with poisonous plants or ticks are unavoidable, use controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, and frequent tick checks. All employees should bath immediately following fieldwork and use soaps/ cleansers designed to remove oils associated with poison oak, and conduct a	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Drilling, Grouting, Monitoring Wells**	**Control #:**	**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			full body tick check using a mirror. If any crew member has a bee allergy, they must have at least one EpiPen properly stored on site.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Drilling, Grouting, Monitoring Wells	Control #:	01-01-03-07

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

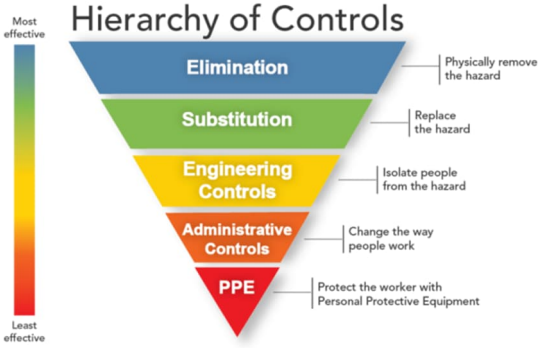
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
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Printed Name	**Signature**
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Driving to and From Site	**Control #:**	01-01-12-02

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☐ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☐ Gloves: Leather / Nitrile ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Emergency kit Communication device (cell phone) Navigation system

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Trip Planning	1a. Unauthorized driving	9	1a. You must be an AECOM authorized driver to drive for AECOM business purposes. Consult the requirements of S3AM-005-PR1. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. Develop a Journey Management Plan if applicable.	4
	1b. Inclement weather	6	1b. Evaluate weather conditions prior to beginning the travel to determine if travel should proceed. Verify your vehicle is equipped to travel in poor weather. Have supplies on hand in the event that you become stranded, including a communication device to call for help.	4
	1c. Getting Lost	6	1c. Review route in advance and program GPS prior to leaving	3
	1d. Inadequate vehicle for the site/trip	7	1d. Understand what type of vehicle is necessary to transport tools & equipment to the site. Know site conditions before departure and obtain proper vehicle, 4-Wheel drive if necessary	4
	1e. Vehicle malfunction	8	1e. Inspect vehicle prior to leaving. Verify that maintenance records are current.	4
On-Site Edits:				
2. Driving	2a. Fatigue	**15**	2a. Start trip well rested & take breaks when needed. Share driving responsibilities where possible. **STOP DRIVING AND PULL OVER** in a safe place if you begin nodding off or showing other signs of fatigue.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Driving to and From Site**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	2b. Risky driving practices	**15**	2b. Practice defensive driving techniques and avoid bad driving habits • Allow for adequate time to make the trip • Do not speed or attempt to multi-task • Do not use cell phone or text or attempt to program GPS while driving	4
On-Site Edits:				
3. Stops/breaks during transit	3a. Theft of equipment/materials	6	3a. Place any likely theft items out of sight and lock vehicle when leaving it. Do not leave vehicle unattended for longer than necessary. If at all possible, avoid leaving packed vehicles in public parking areas overnight, unload if possible. Park in well lighted areas.	4
	3b. Personal security risk	**10**	3b. Be alert and aware of surroundings when making stops. Stop at areas which are well lit and have security if possible.	3
On-Site Edits:				

Additional Notes:

Task Hazard Assessment

AECOM Imagine it. Delivered.

All Employees:

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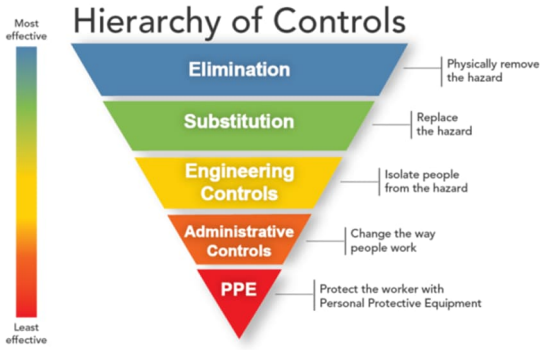
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Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	**Control #:**	01-01-05-07

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand Tools Liquid level/Interface probe Decon materials

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Visually clear proposed gauging locations	1a. Exposure to biologic hazards: insects, poisonous plants and animals. Injuries could include anaphylactic shock, allergic reaction, rabies	6	1a. Identify and avoid hazardous plants and animals on site. Look for signs (spider webs, droppings, etc.). Wear cut resistant gloves, insect repellant; use a broom or a rake to move vegetation, not your hand or foot; move slowly	4
	1b. Damage to equipment or vehicles due to surface / subsurface obstructions	6	1b. Investigate travel path. Look for surface obstructions such as rubble, debris, old foundations or rebar. Use spotter is available or park in such a manner as to not have to back-up.	4
	1c. Slips / trips / falls due to uneven terrain resulting in broken bones or torn ligaments.	6	1c. Identify, mark and avoid slip, trip and fall hazards (holes, obstructions protruding from the ground, or debris). Contact PM immediately and do not proceed if any conditions are observed that cannot be controlled to make well gauging in the area safe.	4
	1d. Struck by vehicle resulting in severe trauma or death	**10**	1d. Visually inspect roadway for moving equipment if walking and set up vehicle as a barrier if driving. Set up exclusion zone around each well. Don reflective vest	4
On-Site Edits:				
2. Opening well casings / flush-mount covers and well plug lock	2a. Cuts / lacerations / crushing, bruises	6	2a. Avoid touching sharp materials/ edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers, and feet clear when opening and closing well cover. Inspect ground before kneeling, d on knee pads.	2
	2b. Back strain	4	2b. Stretch before working. DO NOT use awkward positioning. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	2c. Vapor exposure resulting in inhalation hazards or illness	4	2c. Stand upwind from the well opening to avoid vapor exposure. Loosen well cap slowly, keeping control if pressure is released due to vapors. Keep face out of line-of-fire.	2
	2d. Biologic hazards: insects, poisonous plants, and animals	6	2d. Slowly lift the well cover away from person and look for insects underneath the well. Use long handle tool to remove or kill any insects (i.e. screwdriver).	4
On-Site Edits:				
3. Lowering fluid meter probe and measuring tape to detect fluid level and total depth	3a. Cuts / lacerations / bruises to knees (flush mount)	4	3a. Inspect ground before kneeling. Remove any objects. Don knee pads	2
	3b. Aches and strains from repetitive motion	4	3b. Do not use awkward positioning. Keep back straight, take regular rest/stretch breaks. Change position regularly.	2
	3c. Exposure to chemical hazards in groundwater resulting in skin irritation or illness	3	3c. Use smooth movements to avoid splashes. Don nitrile gloves over cut resistant gloves and safety glasses with side shields. Check gloves for damages/ rips.	2
On-Site Edits:				
4. Removing fluid meter measuring tape and probe from well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness	4	4a. Stay upwind to avoid vapor exposure.	2
	4b. Cross contamination of equipment	4	4b. Clean the tape and probe using non-phosphate soap and distilled water. Wipe with clean paper towel. Collect decontamination materials for waste disposal. Wear disposable nitrile gloves.	2
	4c. Cuts / lacerations / bruises to knees (flush mount)	4	4c. Don knee pads and inspect ground before kneeling down and take frequent breaks to stand and stretch.	2
	4d. Aches and strains from repetitive motion	4	4d. See Step 3b.	2
	4e. Trips / falls from entanglement in measuring tape	3	4e. Check for location of measuring tape before walking or moving around.	2

Task Hazard Analysis

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Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	**Control #:**	

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On-Site Edits:				
5. Closing well casings / flush-mount covers	5a. Cuts / lacerations / crushing / bruises	4	5a. Avoid touching sharp materials/ edges. Keep face, hands, fingers, and feet clear when opening and closing well cover. Don knee pads and inspect ground before kneeling down.	2
	5b. Back strain from heavy / awkward materials handling	4	5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly. * Verify that well covers are secure upon departure.	2
On-Site Edits:				
6. Gather gauging equipment and tools, place in work vehicle	6a. Cuts / lacerations / crushing / bruises from gathering or dropping equipment	3	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing.	2
	6b. Aches and strains from improper lifting	4	6b. Bend and lift with legs. Keep back straight. Take regular rest/ stretch breaks. Change position regularly. Team lift is required for items over 50 lbs. (or awkward items). * Verify all tools and equipment are removed from the site.	2
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	Control #:	

All Employees:

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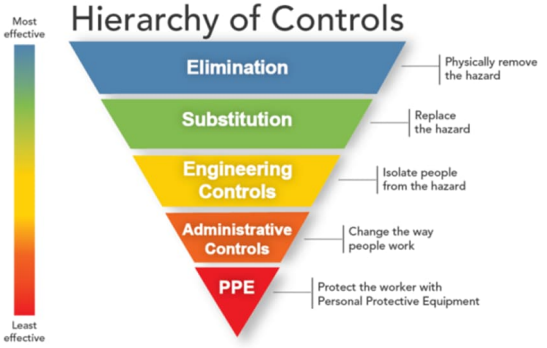
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Geophysical Logging	**Control #:**	**01-01-05-08**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Cut Resistant ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Geophysical Logging Truck Hand Tools

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Backup logging truck near boring/well	**1a.** Logging truck striking personnel or objects	9	**1a.** Use spotter, place cones and work zone warnings as appropriate, stop other nearby work. Discuss hand signals with driver.	4
	1b. Exposure to borehole/well vapors	6	**1b.** Park logging truck upwind from well/borehole.	2
On-Site Edits:				
2. Unload/load tools and supplies	**2a.** Cuts or hand injuries from pinch/crush points	6	**2a.** Inspect equipment for damage and sharp edges, replace all broken or damaged equipment. Wear cut resistant gloves at all times and watch hand placement to avoid sharp edges and pinch points. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	2
	2b. Back strain/ overexertion when unloading equipment	6	**2b.** Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from the side of the truck bed.	3
	2c. Slip, Trip or Falls	6	**2c.** Maintain good housekeeping in work area, do not carry equipment where visibility of ground is impaired, remove or mark all trip hazards in work area.	2
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Geophysical Logging	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
3. Inspect and open well lids	**3a.** Pinch points	8	**3a.** Keep fingers and hands out from between well casing and well lids. Use hand tools when appropriate to keep hands out of pinch points. Wear cut resistant gloves.	3
	3b. Exposure to biological hazards	9	**3b.** Visually inspect well lids and casings for biological hazards, including spiders, insects, etc. Clean area out as appropriate with hand tools or bug spray.	3
On-Site Edits:				
4. Assemble Logging Instruments	**4a.** Pinch points on the logging winch	8	**4a.** Keep fingers and clothing away from the winch's drive chain and/or cable. Wear cut resistant gloves.	3
	4b. Slip, Trip, Falls	6	**4b.** Prohibit stepping over or going under cable.	2
On-Site Edits:				
5. Logging Borehole/well	**5a.** Caught in pulleys, guide or rotating equipment.	8	**5a.** Stay clear of moving equipment. Do not wear loose fitting clothing or jewelry.	3
	5b. Exposure to borehole/well vapors	6	**5b.** Conduct air monitoring with PID at borehole before placing equipment in well. Review and understand Action Levels noted in the HASP.	2
On-Site Edits:				
6. Decontaminating Equipment	**6a.** Exposure to site contaminants	6	**6a.** Wear appropriate PPE (nitrile gloves, face shield, etc)	2
	6b. Back strain	6	**6b.** Bend and lift with legs and arms, not back.	3
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Geophysical Logging	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Geophysical Logging	**Control #:**	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

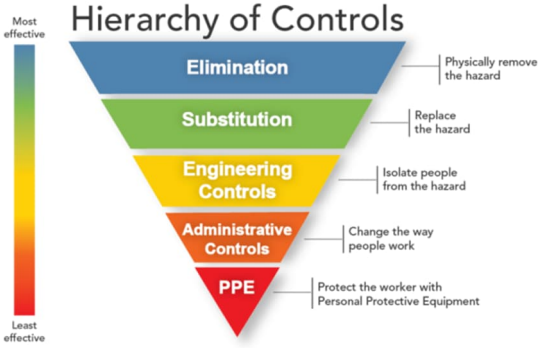
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
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Printed Name	**Signature**
1. Supervisor:	
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Geoprobe Drilling Oversight	**Control #:**	01-01-03-01

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile ☒ Hearing Protection ☐ Other:
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Mobilization	1a. Striking unidentified underground utilities	15	1a. Call public utility locating service prior to initiating work activities. Use private locating service to mark out areas on private property. Verify location of utility marks; do not perform intrusive work if utility location marks cannot be found or if marks are destroyed. Preserve utility marks as much as possible. Call to have utilities remarked if unsure as to their location.	4
	1b. Striking overhead utilities	15	1b. Follow the requirements of S3AM-322-PR1 Overhead Lines. Verify adequate clearance of all drilling locations prior to setting up at drilling location.	4
On-Site Edits:				
2. Setting up at drilling location	2a. Biological hazards causing bites, stings or other injury	8	2a. Examine ground surface for biological hazards prior to setting up equipment. If biological hazards exist, move equipment to a different area for set up if possible. Machetes, or other fixed open blade tools, are not permitted for clearing vegetation. Use insect repellent and check clothing for ticks periodically when applicable.	4
	2b. Struck by traffic	10	2b. Be alert to other vehicles or pedestrians if work area is in an area with public access. Communicate with any heavy equipment operators in the area to ensure they know where you and the equipment are located. Don high visibility vest.	4
	2c. Unstable Rig platform	10	2c. Verify with contractor that rig is set up level and properly chocked and blocked.	2
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Geoprobe Drilling Oversight**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

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3. Oversight of rig inspection	3a. Mechanical failure of equipment	**10**	3a. Verify that drilling contractor inspects equipment daily using S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection or equivalent.	4
	3b. Emergency shut off disabled	6	3b. Verify that kill switch on rig is tested and operational	3
On-Site Edits:				
4. Drilling Oversight	4a. Flying debris, caught by/ struck by injuries	8	4a. Keep a safe distance away during rig operation. Do not talk on cell phone or be distracted by paperwork when in immediate proximity to rig. Wear PPE including hard hats, steel-toe safety boots, safety glasses, and hearing protection.	4
	4b. Caught in/by equipment	**10**	4b. Keep hands, feet and other body parts shall be kept away from moving parts. Do not approach operator without making eye contact and getting approval.	4
	4c. Exposure to contaminants	8	4c. Position yourself upwind of the borehole whenever possible. Perform air monitoring using a PID as described in the HASP. **STOP WORK** if the action level is exceeded.	4
	4d. Noise-induced hearing loss	5	4d. Setup away from noisy operations. Don't be near the rig when hammering. Wear hearing protection.	3
On-Site Edits:				
5.	5a.		5a.	
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Geoprobe Drilling Oversight	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Geoprobe Drilling Oversight	Control #:	

All Employees:

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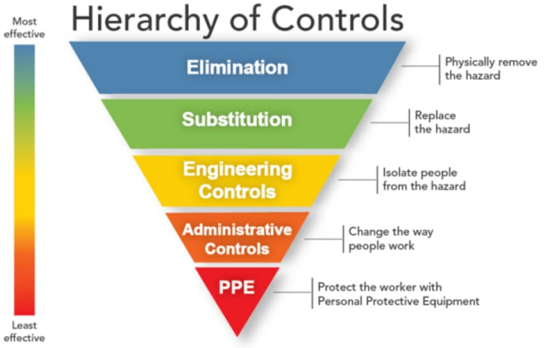
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Groundwater Sampling – Low Flow**	**Control #:**	**01-01-05-12**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, cut resistant ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand tools YSI Pump

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Visually clear proposed sampling locations	1a. Exposure to biological hazards: insects, poisonous plants and animals. Injuries could include anaphylactic shock, allergic reactions, rabies.	6	1a. Identify and avoid hazardous plants and animals on site. Look for signs (spider webs, droppings, etc.). Wear cut resistant gloves, insect repellant, use a broom or a rake to move vegetation, not your hand or foot, move slowly	4
	1b. Slip/trips, falls due to uneven terrain resulting in broken bones or torn ligaments.	6	1b. Identify, mark and avoid slip, trip and fall hazards (holes, obstructions protruding from ground, or debris). Contact PM immediately and do not proceed if any conditions are observed that cannot be controlled to make well sampling in the area safe.	4
	1c. Struck by vehicle resulting in severe trauma or death	**10**	1c. Visually inspect roadway for moving equipment if walking and set up vehicle as a barrier if driving. Set up exclusion zone around each well. Don reflective vest.	4
On-Site Edits:				
2. Open well casing/flush-mount covers and well plug lock.	2a. Cuts/lacerations/crushing, bruises	6	2a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers, and feet clear when opening and closing well cover. Inspect ground before kneeling. Don knee pads.	2
	2b. Back strain from improper lifting	4	2b. Stretch before working. DO NOT use awkward positioning. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2
		4	2c. Stand upwind from the well opening to avoid vapor exposure. Loosen well cap slowly, keeping control if pressure is released due to vapors. Keep face out of line-of-fire.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Groundwater Sampling – Low Flow**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	2c. Vapor exposure resulting in inhalation hazards or illness 2d. Biologic hazards; insects, poisonous plants, and animals	6	2d. Slowly lift the well cover away from person and look for insects underneath the well. Use long handle tool to remove or kill any insects (i.e. screwdriver).	4
On-Site Edits:				
3. Installing tubing in well and setting up equipment.	3a. Cuts/lacerations/crushing, bruises	6	3a. Avoid touching sharp material/edges. Keep face, hands, fingers feet clear when cutting tubing and setting up equipment. Wear cut resistant ANSI 2 gloves with disposable nitrile over gloves	2
On-Site Edits:				
4. Removing tubing from well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness 4b. Cuts/lacerations/bruises to knee (flush mount)	4 4	4a. Stay upwind to avoid vapor exposure 4b. Don knee pads and inspect ground before kneeling down and take frequent breaks to stand and stretch	2 2
On-Site Edits:				
5. Closing well casings/flush mount covers	5a. Cuts/ lacerations/crushing, bruises 5b. Back strain from heavy/awkward material handling	4 4	5a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers feet clear when closing well cover. Don knee pads and inspect ground before kneeling down. 5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Groundwater Sampling – Low Flow**	**Control #:**	

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On-Site Edits:				
6. Gather sampling equipment and tools, place in work vehicle	6a. Cuts/lacerations/crushing/bruises from gathering or dropping equipment 6b. Aches and strains from improper lifting	3 4	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing. 6b. Bend and lift with legs. Keep back straight. Take regular rest/stretch breaks. Change position regularly. Team lift is required for items over 50 lbs (or awkward items)	2 2
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

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Task Name:	Groundwater Sampling – Low Flow	Control #:	

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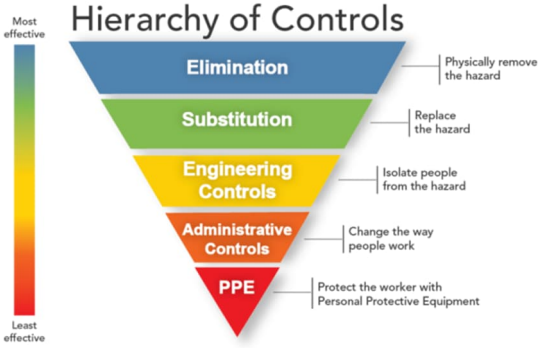
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Hand and Power Tools	**Control #:**	01-01-08-01

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Boots ☒ Gloves: cut/impact resistant based on Glove Needs Assessment ☐ Hearing Protection: based on hearing protection ☐ Other: needs assessment
Tools & Equipment:	Hand and Powered Tools, e.g., drills, sledgehammers, shovels, digging bars, sanders, hammers

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Using Hand or Power Tools	1a. Broken bones or cuts due to improper tools for task	8	1a. Inspect tools prior to use. Broken or worn tools should be repaired or replaced. Use tools for their intended purpose to avoid unexpected failure. Don leather gloves and safety glasses when inspecting tools.	3
	1b. Cuts, contusions or sprains to various body parts due to tool use	8	1b. Look around and behind you before starting. • Inspect tools prior to use. Broken or worn tools should be repaired or replaced. Use tools for their intended purpose to avoid unexpected failure. • Ensure work area is free of clutter or other workers which may interfere with ability to handle tools safely. • Do not swing or apply tool (sledge hammer, shovel, digging bar) until area is free of bystanders. • Do not use extreme force. Use controlled motions and avoid having prying tool "break free". • Ensure limbs such as hands, and digits such as fingers and toes, are out of the "line of fire" prior to undertaking the task. • Review and understand manufacturer's instructions and ensure they are followed. • Use tools only for tasks they were designed/intended, not as stand-in for tools unavailable.	8

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Hand and Power Tools**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			• Don safety glasses, leather gloves.	
	1c. Slips, trips, and fall injuries	8	1c. Practice required housekeeping and frequently clear debris if created by the use of the hand or power tools. Keep unused tools off the ground. Do not carry debris long distances for disposal; if possible, park support vehicles in close proximity to well.	3
	1d. Eye or body injury from flying debris	8	1d. Observers should maintain a 2' distance from the area of work, have donned protective PPE, and are outside of the "line of fire". Remain vigilant as a support to the worker handling the tools, and do not distract or interfere abruptly with that worker.	3
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Hand and Power Tools	Control #:	

All Employees:

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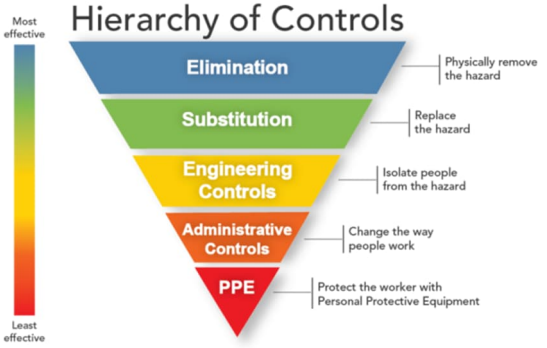
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Task Hazard Assessment

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Task Name:	**Hollow Stem Auger Drilling Oversight**	**Control #:**	**01-01-03-05**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile ☒ Hearing Protection ☐ Other:
Tools & Equipment:	PID Noise/Sound Meter or app

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Mobilization	1a. Striking unidentified underground utilities	15	1a. Call public utility locating service prior to initiating work activities. Use private locating service to mark out areas on private property. Verify location of utility marks; do not perform intrusive work if utility location marks cannot be found or if marks are destroyed. Preserve utility marks as much as possible. Call to have utilities remarked if unsure as to their location.	4
	1b. Striking overhead utilities	15	1b. Follow the requirements of S3AM-322-PR1 Overhead Lines. Verify adequate clearance of all drilling locations prior to setting up at drilling location.	4
On-Site Edits:				
2. Setting up at drilling location	2a. Biological hazards causing bites, stings or other injury	8	2a. Examine ground surface for biological hazards prior to setting up equipment. If biological hazards exist, move equipment to a different area for set up if possible. Machetes, or other fixed open blade tools, are not permitted for clearing vegetation. Use insect repellent and check clothing for ticks periodically when applicable.	4
	2b. Struck by traffic causing serious bodily injury	10	2b. Be alert to other vehicles or pedestrians if work area is in an area with public access. Communicate with any heavy equipment operators in the area to ensure they know where you and the equipment are located. Don high visibility vest.	4
	2c. Unstable Rig platform causing tip/fall with cruching injuries	10	2c. Verify with contractor that rig is set up level and properly chocked and blocked.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Hollow Stem Auger Drilling Oversight**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
3. Oversight of rig inspection	3a. Mechanical failure of equipment	**10**	3a. Verify that drilling contractor inspects equipment daily using S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection or equivalent.	4
	3b. Emergency shut off disabled	6	3b. Verify that kill switch on rig is tested and operational	3
On-Site Edits:				
4. Drilling Oversight	4a. Flying debris, caught by/ struck by injuries	8	4a. Keep a safe distance away during rig operation. Always stand outside of the tip/fall radius of the mast, recommended safe distance is to be no less than 30 feet away from the rig, or the mast height plus 5 feet. Do not talk on cell phone or be distracted by paperwork when in immediate proximity to rig. Stay a safe distance (minimum 5') from outriggers. Do not place or store any equipment on the rig. Verify that all personnel follow S3NA_321_PR1 Drilling, Boring, Direct Push Probing. Wear PPE including hard hats, steel-toe safety boots, safety glasses, and hearing protection.	4
	4b. Caught in/by equipment	**10**	4b. Keep hands, feet and other body parts shall be kept a minimum of 5' away from moving parts. When augers are rotating, stay clear of the rotating auger and other rotating/moving components of the drill rig, i.e. outriggers. Do not approach operator without making eye contact and getting approval. Watch for loose clothing (hooded sweatshirts, baggy clothing, loose shoelaces).	4
	4c. Exposure to contaminants causing injury or illness	8	4c. Position yourself upwind of the borehole whenever possible. Perform air monitoring using a PID as described in the HASP. **STOP WORK** if the action level is exceeded.	4
	4d. Noise-induced hearing loss from loud drilling operations	5	4d. Setup at least 30' away from noisy operations. Don't be near the rig when hammering. Measure dB levels with a noise meter. Wear hearing protection.	3
On-Site Edits:				
5.	5a.		5a.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Hollow Stem Auger Drilling Oversight**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Hollow Stem Auger Drilling Oversight	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

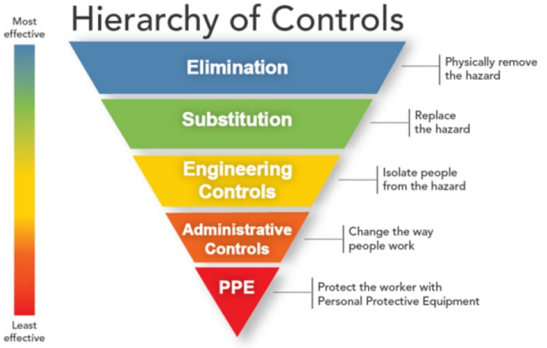
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





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- ***What should you do? Stack your controls***
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Worker Sign On	
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Printed Name	**Signature**
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Investigation Derived Waste Management	**Control #:**	01-01-14-02

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☐ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather or work gloves with Nitrile undergloves	☐ Hearing Protection	☒ Other: Tyvek as needed to protect skin and clothing	
Tools & Equipment:	Socket set	55-gallon open top drum	Emergency eyewash and rinse water	Spill kit Photoionization detector with 11.7 eV lamp

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Secure work area from traffic	1a. Struck by traffic	**10**	1a. Establish work area so that each site vehicle used for activity are in close proximity of each other; this would prevent unnecessary trips outside of work zone and into potential traffic area. Establish barricaded area using cones and barricade tape. Wear required highly visible clothing.	**4**
On-Site Edits:				
2. Prepare work area	2a. Trips & falls 2b. Tools and emergency equipment not present	6 8	2a. Clear any trip/fall hazards from work area. Scan ground prior to moving or walking 2b. Obtain tools and emergency equipment and stage adjacent to work area	4 4
On-Site Edits:				
3. Remove drum lid	3a. Pinch points at drum ring 3b. Sharp edges on drum ring or rim	6 7	3a. Use socket set to loosen drum ring, avoid placing fingers in to pinch points. Make sure cut-resistant gloves fit properly (not too big so fingertips get caught) 3b. Evaluate rim and ring for sharp edges, avoid handling as much as possible. Wear cut resistant gloves	4 4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Investigation Derived Waste Management**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
4. Load soil into drums	4a. Exertion/sprains/strains	8	4a. Exertion/sprains/strains • Use proper lifting techniques; this consists of bending your knees and lifting with your back straight. • Shovel loads heavier than 50 lbs or awkward to handle use a mechanical loading device or ask for help. • Grasp shovel handle properly: Position one hand at base of shovel handle and your other hand near the top of the handle. • Rotate task with others if needed and take breaks.	7
	4b. Exposure to contaminants	6	4b. Exposure • Set up upwind of drum. • Wear PPE (e.g., eye protection-goggles, long pants, Nitrile exam gloves, Nitrile over-gloves (11-mil), long wrist) Tyvek coveralls, shirt with sleeves, steel-toed shoes with boot covers, half-face air purifying respirator fitted with an organic vapor, acid, HEPA filter combination cartridge). • Perform air monitoring as per HASP. **STOP WORK** if action level is exceeded.	4
	4c. Slips/trips/falls	6	4c. Be alert for uneven and slippery terrain. Keep tools and equipment away from walking paths.	4
	4d. Sharp edges on drum rim	6	4d. Inspect rim for sharp and rough edges, avoid leaning into drum or placing hands onto rim edge Wear cut-resistant gloves	2
On-Site Edits:				
5. Replacing drum ring	5a. Pinch points	7	5a. Use socket set to tighten drum ring, avoid placing fingers in to pinch points. Make sure gloves fit properly (not too big so fingertips get caught)	5
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Investigation Derived Waste Management**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
6. Moving/relocating drums	6a. Exertion	**15**	6a. Exertion • If drums must be moved utilize a drum dolly. • DO NOT ATTEMPT TO "WALK" or "ROCK" DRUMS TO MOVE THEM. • Drums can become unstable and easily tip-over causing possible damage and personal injury as well as releasing the material contained.	4
	6b. Trips and Falls	**6**	6b. See 2a above	5
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Investigation Derived Waste Management	Control #:	

All Employees:

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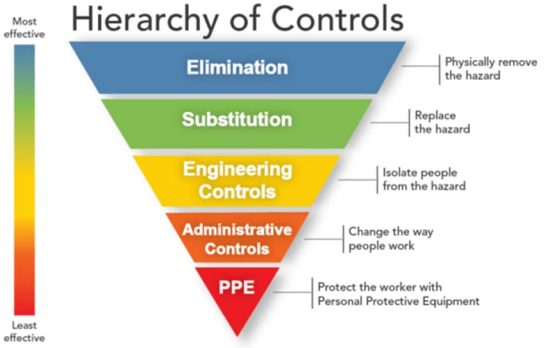
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Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Land Survey – At-Grade**	**Control #:**	**01-01-10-06**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather/mechanic ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Survey Equipment Hammer Stakes/pins

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Setup and use typical survey equipment	1a. Straining back or other parts of body due to improperly lifting or moving heavy objects	4	1a. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from over the side of the truck bed	2
	1b. Bruising or broken bone in finger due to getting caught in a pinch point in the survey equipment.	4	1b. Avoid placing hands near the sides or bottom of the tailgate. Ensure no other workers have their hands near the pinch points and that hands should be all clear. Carefully use the survey equipment watching for pinch points. Wear leather or Kevlar gloves	3
	1c. Straining, tearing or fracturing body parts from slipping, tripping or falling from carrying too much equipment at one time	4	1c. Do not try to carry too much. If you are carrying something over your shoulder and in both hands, you are at a much greater chance to trip and cannot catch yourself. Make multiple loads or get assistance.	2
	1d. Straining a wrist, arm or neck or sustaining other ergonomic injury due to prolonged survey work	4	1d. Survey work can be repetitive – stretch regularly and report ergonomic injuries (strain, etc) as soon as you notice them.	3
	1e. Injury or illness caused by unwanted contact with various animals, insects or other biological hazards	4	1e. There are many different types of biological hazards that can be encountered on a work site. These include ticks, spiders, mosquitoes, chiggers, poisonous or other noxious plants, alligators, bears, small mammals, bird droppings, small mammals, snakes, etc. Consult S3AM-313-PR1 and the multiple attachments to determine the biological hazards that may be present and the mitigation measures for each. Update to make site-specific	3

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Land Survey – At Grade**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	1f. Sunburn caused by over-exposure to direct sunlight	4	1f. Have sunblock available and apply and reapply as per directions. Avoid direct solar exposure when possible. Seek breaks in shaded areas	2
On-Site Edits:				
2. Hammering stakes/nails/benchmarks into ground	2a. Sustaining serious personal injury or utility damage from contacting nearby utilities	8	2a. Ensure subsurface clearance protocol and permit requirements are being followed (in many states one-call must be performed before driving benchmarks – which can be 36 inch long- into ground) before beginning work. If a utility, pea gravel, or non-native fill material is encountered, **STOP WORK** and call the PM	3
	2b. Straining back or pulling other muscles from repetitive hammering action	4	2b. Do not turn at waist, turn with arms and shoulders and keep both feet square. Be mindful to take breaks and rotate shifts.	3
	2c. Pinching hands or developing blisters from improper use of hammers and other equipment.	4	2c. Note line of fire and position hands where you cannot get struck by the hammer. Pay attention to the task at hand and avoid distractions. Wear gloves to avoid blisters and reduce chance of injury.	2
	2d. Eye injury due to flying debris	4	2d. Inspect tools and stakes/pins for chips, burs, and "mushrooming". Ensure no one is standing within 10' of your work area. Wear safety glasses when using the hammer to prevent flying debris from hitting eyes	2
On-Site Edits:				
3. Working near roadway	3a. Sustaining critical injuries caused by being struck by oncoming vehicles	**15**	3a. Place "Surveyor Ahead" signs when possible. Work outside guardrail whenever possible. Keep AECOM vehicle parked between you and oncoming traffic, with wheels pointed away from road, and all flashing lights on. Place cones between traveled way, and you. If working adjacent to high-speed roadway (55 mph or above), you MUST have a spotter who is observing traffic at all times. Wear high-visible vest.	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Land Survey – At Grade	Control #:	

All Employees:

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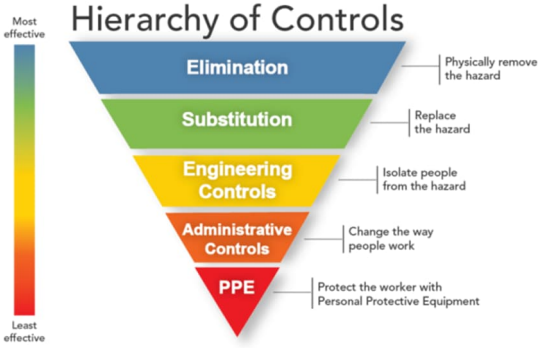
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Load and Unload Vehicle	**Control #:**	01-01-12-04

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: High vis mechanix style gloves ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand truck or dolly

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Load & Unload Vehicle	1a. Sprains/strains/ overexertion	8	1a. To minimize the risk: • Use dollies, carts, come-alongs, or rollers whenever possible rather than the employee physically moving materials. • Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist. Do not lift over 49 lbs. without assistance. Seek assistance when needed and know your lifting limit • Minimize distance needed to move materials and stage loading and unloading areas as close as possible.	4 4
	1b. Pinch points between load and vehicle or between load items	**10**	1b. Know where your hands and other people's hands are at all times. Wear high vis gloves as a reminder. Avoid placing fingers under load while positioning. Use caution with tailgates and vehicle doors, especially under windy conditions.	
	1c. Slips/trips/falls	**10**	1c. Inspect and clear walking path prior to beginning loading. Do not stack loads that impair visibility.	4
	1d. Nicks and cuts from equipment edges	6	1d. Inspect materials and equipment for rough edges and burrs. Wear cut resistant gloves.	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Load and Unload Vehicle**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
2. Secure & cover exposed loads	2a. Line of fire hazards from straps/bungee cords	**15**	2a. Do not throw straps toward other personnel. Using extreme caution when stretching the bungee cord over a load. ALWAYS use safety glasses when handling bungee cords. Securing hook ends carefully and never extend the cord beyond its capacity of length or load. Keep your face and other parts away from the cord's rebound path just in case of failure or recoil.	4
	2b. Load shift in transit	**10**	2b. Use straps or bungee cords to properly secure load. Use a bulkhead to prevent heavy loads from shifting upon sudden stops.	4
	2c. Theft of tools & equipment	8	2c. Place any likely theft items out of sight and lock vehicle when leaving it. Do not leave vehicle unattended for longer than necessary. If at all possible, avoid leaving packed vehicles in public parking areas overnight, unload if possible. Park in well lighted areas.	4
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Load and Unload Vehicle	Control #:	

All Employees:

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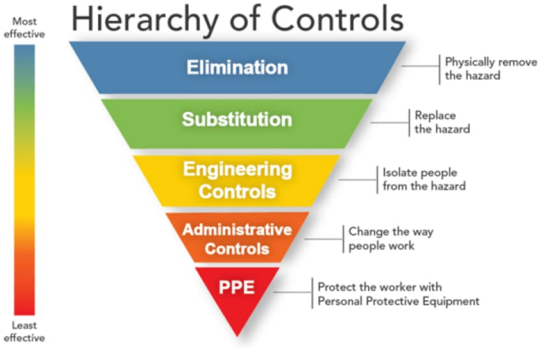
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	**01-01-05-05**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	X Hard Hat X Safety Glasses X HiVis Vest X Safety Toe Boots X Gloves: _____ ☐ Hearing Protection ☐ Other: _____
Tools & Equipment:	First Aid Kit Fire Extinguisher Decon Supplies 4-gas multi-meter Hand tools

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Contact One-Call, private utility contractor, and/or site personnel to locate and mark underground utilities.	1a. Failure to have underground utilities identified could result in explosion, electrocution, injury, death, property damage.	**10**	1a. Call public utility locating service prior to initiating work activities. Use private locating service to mark out areas on private property. Verify location of utility marks; do not perform intrusive work if utility location marks cannot be found or if marks are destroyed. Preserve utility marks as much as possible. Call to have utilities remarked if unsure as to their location.	4
On-Site Edits:				
2. Unload equipment	2a. Cuts or hand injuries from pinch points	6	2a. Inspect equipment for damage and sharp edges, replace all broken or damaged equipment. Wear cut resistant gloves at all times and watch hand placement to avoid sharp edges and pinch points. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	2
	2b. Back strain/ overexertion when unloading equipment	6	2b. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from the side of the truck bed.	2
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Construction	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
3. Set up work zone	3a. Struck by vehicle or equipment traffic	8	3a. Establish work zone using traffic control devices, signs, cones, etc. in advance of initiating monitoring well abandonment activities. Restrict access to observers and passersby.	4
	3b. Slip, Trip or Fall	6	3b. Maintain good housekeeping in work area, do not carry equipment where visibility of ground is impaired, remove or mark all trip hazards in work area.	2
On-Site Edits:				
4. Position drill rig over pre-cleared borehole in position to tower up mast	4a. Struck-by, crushed-by, caught-by drill rig.	**10**	4a. Communicate path of movement to all project personnel. Establish and use agreed upon hand signals during spotting activities. Always use a spotter(s) to direct movement of drill rig and watch for vehicle and pedestrian traffic. Additional spotter(s) will be used in high traffic areas and in areas with blind spots where traffic is difficult to observe.	4
	4b. Contact with overhead utilities.	**10**	4b. Keep a minimum of 15 feet from overhead power lines (20 ft. if 230-285 KV, 25 ft. if 285-345 KV, 35 ft. if 345-500 KV) Check HASP to ensure client/site does not have stricter requirements.	4
	4c. Slip, trip, and fall (STF) hazards from uneven	8	4c. Check walking/movement path for STF obstructions. Conduct pre-site walk with crew prior to drilling and remove or isolate STF hazards.	4
	4d. Hydraulic failure causing release to the environment.	**10**	4d. Place secondary containment on ground under rig. Ensure that secondary containment is setup with 'berms/barriers' or containment is securely clipped onto the rig tracks/wheels to protect from any fluid leaking off the plastic.	3
On-Site Edits:				
5. Commence drilling	5a. Pinch points	6	5a. Never place hands, fingers, feet under the bottom of an auger flight, or other location where these heavy items could be set down or could fall suddenly.	2
	5b. Entanglement	**10**	5b. Ensure rotating parts are properly guarded. Remove loose clothing and jewelry that could become entangled in moving parts. Use a long handled shovel to remove cuttings from the auger.	4
	5c. Noise	6 8	5c. Wear hearing protection while equipment is in use.	2 4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	5d. Back strain/ overexertion when unloading equipment		5d. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds.	
On-Site Edits:				
6. Well Casing Assembly and Installation	6a. Muscle strain. 6b. Slip, trip, and fall (STF) hazards from uneven 6c. Injury from improper tool use. 6d. Dust inhalation. 6e. Cutting PVC, cuts, lacerations 6f. Exposure to airborne chemicals or explosive atmosphere 6g. Crushed by, pinch point on drill rig	8 8 8 6 8 8 **10**	6a. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. 6b. Check walking/movement path for STF obstructions. Conduct pre-site walk with crew prior to work and remove or isolate STF hazards. 6c. Do not use tools for unintended purposes (such as a saw to open bags of bentonite instead of an approved cutting tool). 6d. Wear a dust mask and minimize dust when pouring powdered bentonite, concrete, or cement. 6e. Use PVC cutter for cutting PVC. Wear cut-resistant gloves (Level 2), keep fingers and other body parts away from cutting tool blade. 6f. Conduct air monitoring with PID and 4-gas in background areas and breathing zone of all workers, Stop work if PID or LEL indicates action level, Wear respirator with organic vapor cartridge if VOCs cannot be controlled. 6g. Keep body parts away from moving parts on drill rig.	4 4 3 2 3 4 4
On-Site Edits:				
7. Installation of sand filter pack/bentonite	7a. Injury form cutting bags open 7b. Eye and respiratory injury due to dust and other airborne particles 7c. Back or muscle strain due to improper load or lifting techniques	8 6 8	7a. Use a safety knife. No fixed-blade knifes allowed on site. Wear minimum Level 2 cut-resistant gloves. Cut away from the body 7b. Refer to the SDS for use information. Wear long sleeved shirt, long pants, gloves, and safety glasses. Wear a P, N, or R-95 dust respirator when dealing with quartz sand (moving bags, pouring, mixing, and putting bags in trash). 7c. Do not lift anything over 50 lbs. without assistance (partner or appropriate mechanical device). Use proper lifting techniques, lift with legs, keep back straight, and carry object close to body.	4 2 4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

	Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:					

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Construction	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

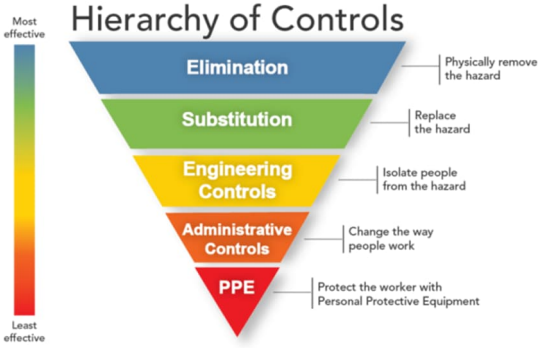
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Oversight of Utility Clearance**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Utility clearing equipment, hand tools, marker flags for utility locations.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Mobilize equipment and personnel to site.	• Driving hazards • Distracted driving • Parking hazards – Striking objects • Fire	12	• Inspect vehicles for defects and complete inspection form. • Implement safe driving practices to prevent transportation incidents. • Secure all loads, including equipment, within the cab. • Do not operate vehicles in unsafe conditions (e.g., on steep slopes, in deep mud). • Use of handheld devices while driving is prohibited. Use devices when vehicle is parked. • When reversing, use caution and a spotter, if available. • Use care when parking off pavement, and do not park over tall grass as the grass may catch fire from the hot vehicle exhaust.	4
On-Site Edits:				
2. Evaluate area for hazards (continuous for entire duration of task).	• Struck by hazards – Vehicle movement • Contact with utilities • Overhead hazards • Slips, trips, and falls, • Heat/cold stress • Biological hazards	12	• Ensure all site personnel have received the necessary site-specific safety and awareness training. Familiarize yourself with site entrances and exits. • Complete AECOM's checklist S3NA-331-FM1, *Underground Utilities & Subsurface Installation Clearance Checklist*, if applicable. • Utilities in the work area should be cleared by completing the appropriate survey prior to drilling operations. • Utilize the "buddy system" when working on-site.	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name: **Oversight of Utility Clearance**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
	• UV exposure • Extreme weather • Fire		• Always use caution when on-site and don Level D PPE minimum. • Check the area for potential overhead utility/power lines and obstructions such as trees. Before moving a rig onto a location, confirm the height of the equipment with the driller/Competent Person. Make sure that the equipment is a minimum safe approach distance from power lines as outlined in AECOM's SH&E SOP S3AM-322-PR1, *Overhead Lines*. Use caution and wear a high-visibility reflective safety vest when working near active roads or around heavy equipment. • Observe and identify area for hazards; Ensure that pathways are clear and free of obstruction prior to initiating work; practice good housekeeping. • Assess weather conditions and begin heat and cold stress monitoring, if applicable. Apply and reapply sunscreen as necessary. • Avoid contact with insects, poisonous plants, and other animals. Conduct frequent checks for bites and other signs of insect or plant exposure. • In the case of severe weather, conditions should be monitored, and precautions taken to protect personnel. In storms, seek immediate shelter and lightning within 10 miles. Do not resume work until 30 minutes have passed since last strike. • Provide portable fire extinguishers in all field vehicles and inspect monthly.	
On-Site Edits:				
3. Mark locations of utilities and other locations, as necessary	• Slips, trips, and falls • Ergonomics • Heat/cold stress • Cuts/abrasions – Improper use of hand tools • Compressed gases • UV exposure • Biological hazards • Chemical exposure	8	• Make sure you have good, solid footing and that walking/working surfaces are as clean and dry as possible. • Always use caution when on-site and don Level D PPE minimum. • Keep work areas free of debris. • Be cautious in wet and muddy conditions. Take the time to find a safe route. • When possible, alternate hands to avoid repetitive use. Do not strain when collecting point measurements. Use arms and shoulders; do not twist your back. • Stay well hydrated, taking water breaks as necessary. • Work/rest regimens shall be adjusted during hot weather. • Assess weather conditions and begin heat and cold stress monitoring, if applicable. Apply and reapply sunscreen as necessary. • Inspect equipment prior to use. Use tools for their intended use only.	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name: **Oversight of Utility Clearance**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			• Use repellents and proper clothing for protection against insects including mosquitoes and ticks. • Use appropriate lifting techniques when handling heavy tools or instruments. • Avoid walking through dense foliage. • Position body upwind when applying spray marking paint. • Use biodegradable, non-hazardous spray marking paint. • Store spray marking paint in an area away from any other equipment that may crush or puncture the cans.	
On-Site Edits:				
4.				
On-Site Edits:				
5.				
On-Site Edits:				

Additional Notes:

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name: **Oversight of Utility Clearance**

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

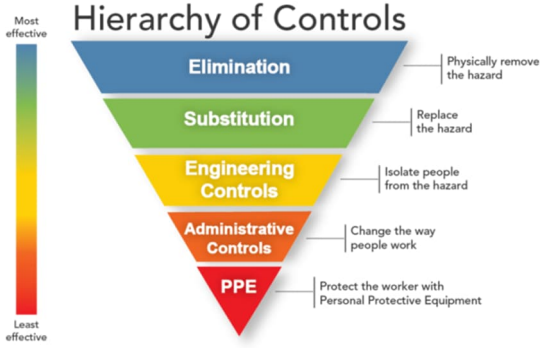
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Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
I participated in the on-site review and fully understand the content of this Activity Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
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Visitor Acknowledgement
Visitors review hazards and acknowledge understanding.
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Site Walk – Construction/Demolition/Rail Site	**Control #:**	01-01-10-01

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Task specific ☒ Hearing Protection ☐ Other:
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Plan the site walk	1a. Not having proper PPE	4	1a. Determine what the basic PPE requirements are in advance and have available or know that they will be available to you to borrow once on site.	4
	1b. Inappropriate vehicle for site	4	1b. Determine what type of vehicle is needed for site conditions (4-wheel drive, truck or car).	4
	1c. Inadequate materials/supplies	4	1c. Determine what materials and supplies you must bring versus what is available on site such as insect spray, sunscreen, drinking water, food, etc.	4
	1d. Lack of site escort if needed	4	1d. Prearrange trip in advance where possible, determine who will be meeting you on site and when.	4
	1e. Inclement weather	6	1e. Plan for the anticipated weather conditions. Check the predicted weather for the worksite prior to departing. Reschedule site visit if severe weather such as lightning storms, sleet/ice storms, blizzards, etc., are predicted.	6
On-Site Edits:				
2. Arriving at site	2a. Parking in inappropriate areas subjecting you and/or vehicle to construction hazards	6	2a. Know where you are supposed to park prior to arrival or check in at site so that you do not subject yourself or your vehicle to site hazards such as construction vehicle traffic, wet/muddy conditions, poor walking surfaces, etc.	2
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Site Walk – Construction/Demolition/Rail Site**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
3. Walking Site/Observing Work	3a. Biological hazards	4	3a. There are many different types of biological hazards that can be encountered on a work site. These include ticks, spiders, mosquitoes, chiggers, poisonous or other noxious plants, alligators, bears, small mammals, bird droppings, small mammals, snakes, etc. Consult S3AM-313-PR1 and the multiple attachments to determine the biological hazards that may be present and the mitigation measures for each.	2
	3b. Feral & wild animals	4	3b. Do not attempt to pick up, handle, or otherwise handle stray or wild animals such as dogs, cats, raccoons, squirrels, etc., no matter how tame they may appear.	2
	3c. Heat stress	6	3c. Know the signs and symptoms of heat stress (refer to the procedure S3AM-113-PR1 for information. Have adequate drinking water available and drink frequently. Arrive at the site well hydrated and physically fit.	3
	3d. Cold stress	6	3d. Know the health concerns associated with working in cold weather including hypothermia, frost bite, etc. (see S3AM-112-PR1). Dress in layers and take warming breaks.	4
	3e. Sunburn	6	3e. Have sunblock available and apply and reapply as per directions. Avoid direct solar exposure when possible. Seek breaks in shaded areas.	3
	3f. Slips/trips/falls	6	3f. Be aware of walking surfaces at all times, wear footwear with good tread and ankle support, use handrails where available, avoid walking in muddy or wet areas when possible, identify and mark or have removed any obstructions that may be present in predicted walking paths.	4
On-Site Edits:				
4. Leaving the site	4a. Transporting biological hazards into vehicle	4	4a. Inspect self for ticks before entering vehicle. If it possible that clothing and personal items such as jackets, backpacks, lunch bags, and so on have been exposed to poisonous plant oils or may harbor ticks or other insects, bag such items until they can be appropriately treated.	2
	4b. Hitting object when leaving	6	4b. Before moving the vehicle, perform a 360° walk around of the vehicle to verify that no changes have been made that may impact exit.	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Site Walk – Construction/Demolition/Rail Site**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
5.	5a.		5a.	
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Site Walk – Construction/Demolition/Rail Site	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

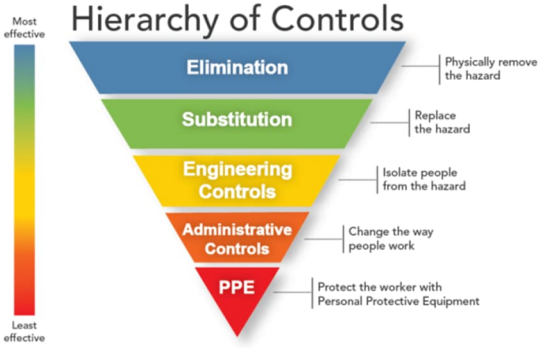
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For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
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Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Site Walk – General Site Visit	**Control #:**	01-01-10-06

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: leather ☒ Hearing Protection ☐ Other: PPE for expected weather conditions
Tools & Equipment:	camera notebook/pen

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Plan the site walk	1a. Personal injury from not having proper PPE	4	1a. Determine what the basic PPE requirements are in advance and have available or know that they will be available to you to borrow once on site.	4
	1b. Vehicle getting stuck or damaged due to terrain/site conditions	4	1b. Determine what type of vehicle is needed for site conditions (4-wheel drive, truck or car).	4
	1c. Heat/cold stress, insect bites, sunburn from inadequate materials/supplies	4	1c. Determine what materials and supplies you must bring versus what is available on site such as insect spray, sunscreen, drinking water, food, etc.	4
	1d. Lack of site escort if needed	4	1d. Prearrange trip in advance where possible, determine who will be meeting you on site and when.	4
	1e. Inclement weather	6	1e. Plan for the anticipated weather conditions. Check the predicted weather for the worksite prior to departing. Reschedule site visit if severe weather such as lightning storms, sleet/ice storms, blizzards, etc., are predicted.	2
On-Site Edits:				
2. Arriving at site	2a. Getting stuck or sustaining slip/trip/fall injuries from parking in inappropriate areas	6	2a. Know where you are supposed to park prior to arrival or check in at site. Park in an area with firm, level surface, and with a good surface (avoiding wet/muddy conditions, poor walking surfaces, etc) available when you exit the vehicle.	2

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Site Walk – General Site Visit**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	2b. Injuries from being struck due to 3rd party or client operations	**10**	2b. Park that you do not subject yourself or your vehicle to site hazards such as construction vehicle traffic, forklifts or other equipment, passing motorists, etc, ,	2
On-Site Edits:				
3. Walking Site/Observing Work	3a. Biological hazards	4	3a. There are many different types of biological hazards that can be encountered on a work site. These include ticks, spiders, mosquitoes, chiggers, poisonous or other noxious plants, alligators, bears, small mammals, bird droppings, small mammals, snakes, etc. Do not attempt to pick up, handle, or otherwise handle stray or wild animals such as dogs, cats, raccoons, squirrels, etc., no matter how tame they may appear.	2
	3b. Slips/trips/falls	4	3b. Be aware of walking surfaces at all times, wear footwear with good tread and ankle support, use handrails where available, avoid walking in muddy or wet areas when possible, identify and mark or have removed any obstructions that may be present in predicted walking paths.	2
	3c. Crossing roads, bridges, etc	6	3c. Keep to pathways appropriate for pedestrian traffic – sidewalks, walkways with handrails, etc. If no sidewalk is present, stay off the side of the shoulder, behind guardrails where possible, etc. Walk facing traffic. Never take photographs while walking to reduce risk of inadvertently wandering into traffic.	3
On-Site Edits:				
4. Leaving the site	4a. Transporting biological hazards into vehicle	4	4a. Inspect self for ticks before entering vehicle. If it possible that clothing and personal items such as jackets, backpacks, lunch bags, and so on have been exposed to poisonous plant oils or may harbor ticks or other insects, bag such items until they can be appropriately treated.	2
	4b. Hitting object when leaving causing vehicle or property damage	6	4b. Before moving the vehicle, perform a 360° walk around of the vehicle to verify that no changes have been made that may impact exit.	4
On-Site Edits:				

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Site Walk – General Site Visit	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

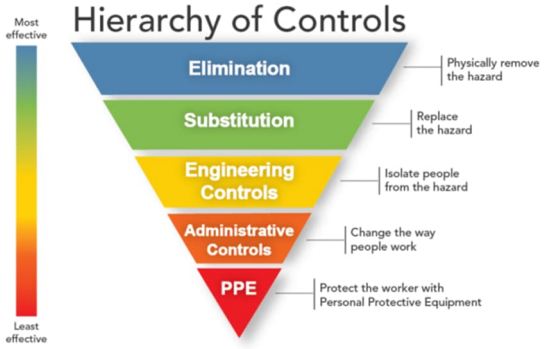
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Soil Sampling with Hand Auger**	**Control #:**	**01-01-09-01**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, CR ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand auger w/extensions Sampling kit

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Setup equipment	1a. Cuts or hand injuries from pinch points	3	1a. Inspect for broken welds on auger. If broken welds or cracks – **STOP WORK**. Wear cut resistant gloves at all times and avoid handling the sharp edges of the auger cup. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	2
	1b. Back strain/ overexertion when unloading equipment	4	1b. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from the side of the truck bed	2
On-Site Edits:				
2. Advancing hand auger	2a. Contacting utilities causing serious personal injury or death.	**10**	2a. Ensure subsurface clearance protocol and permit requirements are being followed before beginning work. Turn the auger slowly and if refusal is met, remove the auger from the borehole and inspect the cause of refusal. If a utility, pea gravel, or non-native fill material is encountered, **STOP WORK** and call the PM.	4
	2b. Back strain or pulled muscle from rotating hand auger.	6	2b. Do not yank on the auger handle. Do not turn at waist, turn with arms and shoulders, keep feet square and lift with legs, do not work with arms above head. Take breaks and rotate work. Use short extensions as you advance to avoid.	4
	2c. Injury from slip, trip, fall.	4	2c. Clear the work area of trip hazards. Walk around bore hole, never over it and cover hole with delineator when unattended.	3
	2d. Injury to eyes from flying debris.	3	2d. If it is windy, stand upwind and switch to goggles to prevent dirt entering eye.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name: Soil Sampling with Hand Auger	**Control #:**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
3. Collecting soil samples	3a. Contact with contaminated soil.	4	3a. Use clean sampler to touch soil. Wear nitrile gloves over the cut resistant gloves at all times. If nitrile tears, stop work and replace glove. For samples with high volatile organics content (PID in breathing zone is constantly above site limits stated in HASP (>5 ppm)) wear breathing protection as stated in HASP. Change Nitriles between samples to avoid cross contamination	2
	3b. Cut from handling auger, sampling tools, jars	6	3b. Inspect containers before and during filling. Do not use if chipped or cracked. Pack containers in coolers so that they will not shift (spacers/ packing materials as needed). Do not over pack coolers.	3
	3c. Muscle strain in back or legs from bending over or squatting	3	3c. Evaluate work surface height (see if chair/ table needed) and sample jar placement to eliminate ergonomic issues. Avoid squatting and bending	2
On-Site Edits:				
4. Adding extensions to auger	4a. Cuts or hand injuries from pinch points	3	4a. Avoid placing hands near connection points of extensions and avoid the sharp edges of the auger cup. Wear cut resistant gloves at all times	2
	4b. Striking another person	3	4b. Check that the swing radius of the auger is clear before moving it	2
	4c. Contacting overhead structure	**10**	4c. Before raising the auger vertically, verify that no overhead lines or structures are present **STOP WORK** and move if electrical lines are in the area	4
On-Site Edits:				
5. Breakdown and decontaminate equipment.	5a. Contact with contaminants and cut hazards	5	5a. Inspect before handling for chips or cracks in glass containers. Wear nitrile gloves over cut resistant gloves. If nitrile tears, stop work and replace glove.	2
	5b. Breaking a sample container resulting in cut, or contact with contents/preservatives	3	5b. Handle containers with care and position over padded or soft surface in case it slips from hand. Place in packing materials that will protect against collisions.	2
	5c. Striking another person	4	5c. Before disassembling auger, verify that no one is in the swing radius.	3

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name: Soil Sampling with Hand Auger	**Control #:**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling with Hand Auger	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

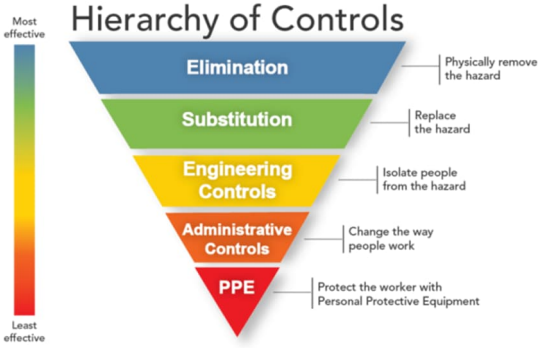
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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- ***What can go wrong?***
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- ***What should you do? Stack your controls***
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Worker Sign On	
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Printed Name	**Signature**
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Visitor Acknowledgement
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling (Surface) with Trowel	**Control #:**	01-01-09-13

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, CR ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Trowel Sampling kit

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Setup equipment	1a. Cuts or hand injuries from pinch points	3	1a. Inspect tools. If broken welds or cracks – **STOP WORK**. Wear cut resistant gloves when working with tools. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	2
	1b. Back strain/ overexertion when unloading equipment	4	1b. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from the side of the truck bed	2
On-Site Edits:				
2. Collecting samples	3a. Contact with contaminated soil/water.	4	3a. Use clean sampler to touch soil. Wear nitrile gloves over the cut resistant gloves at all times. If nitrile tears, stop work and replace glove. For samples with high volatile organics content (PID in breathing zone is constantly above site limits stated in HASP (>5 ppm)) wear breathing protection as stated in HASP. Change Nitriles between samples to avoid cross contamination	2
	3b. Cut from handling auger, sampling tools, jars	6	3b. Inspect containers before and during filling. Do not use if chipped or cracked. Pack containers in coolers so that they will not shift (spacers/ packing materials as needed). Do not over pack coolers.	3
	3c. Muscle strain in back or legs from bending over or squatting	3	3c. Evaluate work surface height (see if chair/ table needed) and sample jar placement to eliminate ergonomic issues. Avoid squatting and bending	2
	3d. Falling into water/drowning	**10**	3d. Wear personal flotation device and have a buddy present when within 3 feet of water.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name: Soil Sampling (Surface) with trowel	**Control #:**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
3. Breakdown and decontaminate equipment.	5a. Contact with contaminants and cut hazards	6	5a. Inspect before handling for chips or cracks in glass containers. Wear nitrile gloves over cut resistant gloves. If nitrile tears, stop work and replace glove.	2
	5b. Breaking a sample container resulting in cut, or contact with contents/preservatives	6	5b. Handle containers with care and position over padded or soft surface in case it slips from hand. Place in packing materials that will protect against collisions.	2
	3e. Striking another person	4	3e. Before moving equipment, verify that no one is in the swing radius.	3
On-Site Edits:				
4.	4a.		4a.	
On-Site Edits:				
5.	5c.		5c.	
On-Site Edits:				
6.	6a.		6a.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name: Soil Sampling (Surface) with trowel	**Control #:**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
7.	7a.		7a.	

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling (Surface) with trowel	Control #:	

All Employees:

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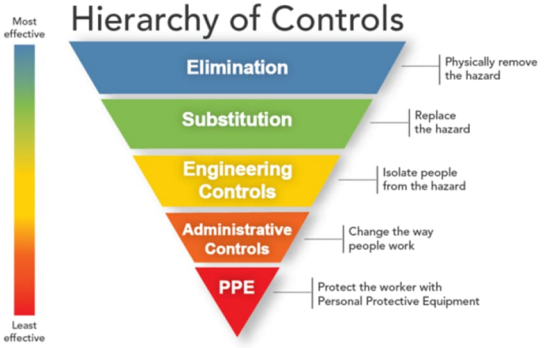
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Worker Sign On	
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Printed Name	**Signature**
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Surface Water Sampling (Pore Water)	**Control #:**	01-01-26-06

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather/mechanic, Leather / Nitrile ☐ Hearing Protection ☒ Other: PFD and waders nitrile, CR
Tools & Equipment:	Sample device PID Unit Bottled water and eyewash

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Inspect area of approach	1a. Slips, trips, fall hazards	8	1a. Evaluate approach: • Investigate planned approach for rocks, branches, debris and other slip/trip/fall hazards. • Evaluate angle of approach and minimize as best as possible. If necessary, secure self to a stationary object using a body harness to provide additional stability. • Have a buddy system in place. • Use a pack to secure tools, sample jars, etc. to have hands free • Wear safety toed boots with slip resistant tread, may upgrade to slip resistant safety toed rubber muck boots.	4
	1b. Animals/Insect bites	6	1b. Inspect area for snakes, insects, and small animals. Wear long pants, long sleeves and keep skin exposure to a minimum.	4
	1c. Falls associated with unstable stream banks causing injury or immersion/hypothermia	8	1c.Use the buddy system. Check stability of stream banks. Maintain awareness of surroundings and maintain communication between team members; identify potential hazards prior to entering area and avoid, when possible Wear	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Surface Water Sampling (Pore Water)**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
2. Insert sampler into desired depth in sediment and collect liquid samples in sampling container via pump or syringe	2a. Exposure to sample preservatives causing burns to skin/eyes 2b. Cuts to skin from cracked or broken glassware	8 6	2a. Avoid contact with preservatives. If contacted: • Flush skin/eyes with water. • Refer to the SDS for specific information relating to the type of preservative • Wear long sleeves, nitrile gloves over cut-resistant gloves and safety glasses 2b. Inspect all glassware before handling. Wear cut resistant gloves when handling broken glassware.	4 4
On-Site Edits:				
3. Soak/spray durable equipment to prevent cross-contamination	3a. Exposure to decontamination chemicals	6	3b. Avoid contact with all decontamination chemicals including (Liquinox, Simple Green, Methanol and any other solvents used on sampling equipment. Avoid splashing. Check wind direction and always spray downwind. Wear disposable nitrile gloves.	4
On-Site Edits:				
4.	4a.		4a.	4 4
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Surface Water Sampling (Pore Water)	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

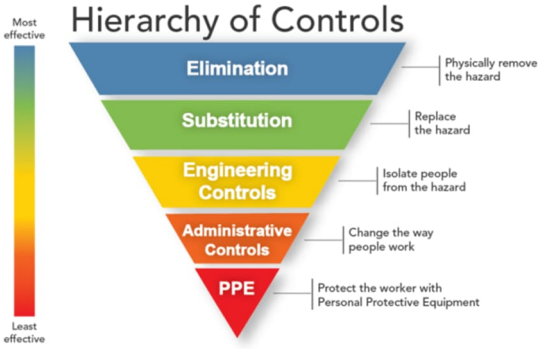
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Surface Water Sampling (Swing Sampler)	**Control #:**	01-01-26-05

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather/mechanic, Leather / Nitrile ☐ Hearing Protection ☒ Other: PFD and waders nitrile, CR
Tools & Equipment:	Sample device PID Unit Bottled water and eyewash

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Inspect area of approach	1a. Slips, trips, fall hazards	8	1a. Evaluate approach: • Investigate planned approach for rocks, branches, debris and other slip/trip/fall hazards. • Evaluate angle of approach and minimize as best as possible. If necessary, secure self to a stationary object using a back belt to provide additional stability. • Have a buddy system in place. • Use a pack to secure tools, sample jars, etc. to have hands free	4
	1b. Animals/Insect bites	6	1b. Inspect area for snakes, insects, and small animals.	4
	1c. Exposure/drowning from falling into water	**15**	1c. Use the buddy system. Stay back from the water's edge as far as possible. Wear a PFD if within 6' of water 3' deep or deeper. Maintain awareness of surroundings and maintain communication between team members; identify potential hazards prior to entering area and avoid, when possible	4
On-Site Edits:				
2. Insert swing sampler with swing jar holder into water body and collect liquid samples in sampling container	2a. Exposure to sample preservatives causing burns to skin/eyes	8	2a. Avoid contact with preservatives. If contacted: • Flush skin/eyes with water. • Refer to the SDS for specific information relating to the type of preservative • Wear long sleeves, nitrile gloves over cut-resistant gloves and safety glasses	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Surface Water Sampling (Swing Sampler)**	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	2b. Cuts to skin from cracked or broken glassware	6	2b. Inspect all glassware before handling. Wear cut resistant gloves when handling broken glassware.	4
On-Site Edits:				
3. Soak/spray durable equipment to prevent cross-contamination	3a. Exposure to decontamination chemicals	6	3b. Avoid contact with all decontamination chemicals including (Liquinox, Simple Green, Methanol and any other solvents used on sampling equipment. Avoid splashing. Wear disposable nitrile gloves.	4
On-Site Edits:				
4.	4a.		4a.	4 4
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Surface Water Sampling (Swing Sampler)	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

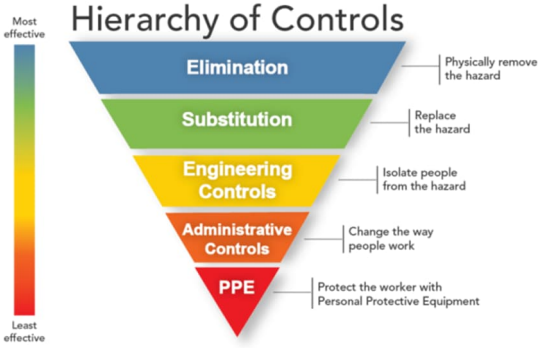
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

- ***What am I about to do?***
- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
2.	
3.	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Working Over Water**	**Control #:**	**01-01-18-01**

Project Name:	Town of Hurley Landfill	**Client:**	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots	☒ Gloves: Leather work gloves or mechanix style gloves ☐ Hearing Protection :	☒ Other— PFD, Float Coat, or Mustang Suit depending on temperature
Tools & Equipment:		USCG Type IV Throwable, Fire Extinguisher FA kit distress signals, navigation lights, anchor, oars	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Pre-work planning	1a. Unprepared for performing work	15	1a. Follow the requirements of S3AM-315-PR1, Work Over Water and S3AM-333-PR1, Marine Safety Operations **INCLUDING ALL APPLICABLE ATTACHMENTS.**	10
	1b. Untrained/unqualified Captain of vessel	12	1b. Verify that captain of vessel is fully qualified to operate the class of vessel to be deployed. he boat operator must possess sufficient experience for the boat operation and trained in the following: ▪ Know the hazards that may be faced during the operation. ▪ Proper use of all equipment. ▪ Recognizes any warning signs of a dangerous or prohibited situation. ▪ Safety requirements for boat launching and exiting from the waterway. ▪ Knowledgeable in how to summon rescue and other emergency services as soon as the operator determines that the boat occupants may need assistance to escape from the waterway hazards.	8
	1c. Inadequate or missing safety or emergency equipment	10	1c. Verify that the vessel is inspected and all emergency equipment specified in the marine Safety Equipment procedure, S3AM-333-ATT5.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Work Over Water**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
2. Boarding vessel	2a. Exposure or drowning from falling into waterway	**15**	3a. Watercraft should remain tied to secure anchoring point during loading and unloading activities. When boarding and exiting, do not attempt to carry other tools or equipment, always maintain on hand on the vessel.	8
	2b. Pinch points between docks and the sides of the boat	6	2b. Be aware of hand position when boarding and exiting vessel	3
On-Site Edits:				
3. Working from watercraft – Environmental Concerns	3a. Exposure or drowning from falling into waterway	**10**	3a. Wear proper PPE (e.g., eye protection, leather gloves, long pants, shirt with sleeves, steel-toe shoes, booties, life vest/preserver). Use the buddy system at all times. • At least two individuals or employees are required and both shall be equipped with a life vest and other appropriate PPE dictated by the atmosphere and other hazards. • If one individual must lean outside of the boat confines to perform a task, a lifeline must be attached to the individual. • If the individual falls out of the boat, the lifeline will permit the individual from floating away from the immediate work area and permit a less hazardous rescue. **Note:** If the passenger of the boat should fall into the waterway, the boat operator should never attempt a rescue by leaving the boat. • Unless the boat is anchored, the operator of the boat shall remain at the steering controls at all times.	8
	3b. Inclement weather	**10**	3b. Know what conditions that exist that prevent boating including small craft weather advisory, ice flows or ice packs on waterway ,thunderstorms, high	6

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Work Over Water**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	3c. Hypothermia	10	wind, excessive boat traffic, etc. **STOP WORK** and exit the water if these conditions exist or can be anticipated. 3c. Discuss symptoms of hypothermia before deployment. Have a means of warming (hot liquids, hand warmers, etc., and a set of dry clothing, etc. available on the vessel. Change into dry clothing if you become wet at cold temperatures. When the water temperature is between 40 and 50 degrees Fahrenheit, field personnel working on the river or canal shall wear a float coat (top half of a Mustang Suit) or a one-piece survival suit. When the water temperature is less than 40 degrees Fahrenheit, field personnel shall wear either a float coat with bib-overalls (a full two-piece Mustang Suit), or a one-piece survival suit.	5
	3d. Heat stress/heat stress	6	3d. Provide adequate drinking water and electrolytes. Have a heat stress control plan (including shelters, work rotation, methods of cooling). Review prevention, symptoms and treatment guidance before deployment.	4
	3e. Sunburn	8	3e. Wear sunscreen and hat, prevent as much solar exposure as possible.	5
On-Site Edits:				
4. Working from watercraft – Physical Hazards	4a. Vessel unstable, vessel collapse, or overweight	12	4a. Select correct vessel for the work & do not carry weight in excess of vessel capacity. Allow for fuel and weight of samples, etc., to be brought on board.	4
	4b. Slips/trips/falls on vessel	10	4b. Avoid standing up in vessel. If necessary, have one hand holding onto the boat. Keep Practice good housekeeping to keep the ground around the sampling location clear of obstructions, equipment and other tripping hazards. Whenever there exists the possibility of falling into water, personnel must be attired in a USCG approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured at all times.	4
	4c. Striking submerged underwater hazards or going aground on mud flats or shallow bottoms	8	4c. Be aware of tidal levels and proximity to shallow water. Be aware of underwater debris near site and shoreline.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Work Over Water**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!			
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
5. Working from watercraft – Biological Hazards	5a. Poisonous plants, ticks, mosquitoes and other insects	6	5a. Assess work area for poisonous plants and communicate observations to avoid them. All field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants oils and inspects. If contact with poisonous plants or ticks are unavoidable, use controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, and frequent tick checks. All employees should bath immediately following fieldwork and use soaps/ cleansers designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror.	4
On-Site Edits:				
6.	5a.		5a.	
On-Site Edits:				
7.	6a.		6a.	
On-Site Edits:				

Task Hazard Analysis

Task Name:	Work Over Water	

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Work Over Water	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

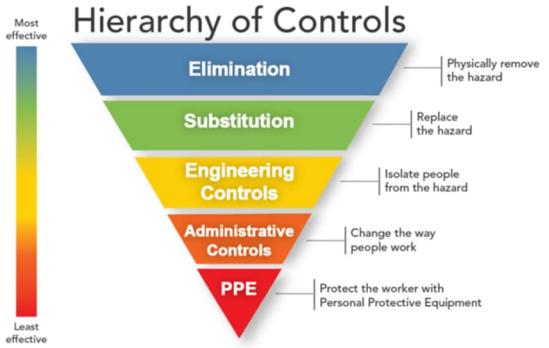
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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- ***What am I about to do?***
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For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories





- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
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Worker Sign On	
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Printed Name	**Signature**
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Task Hazard Analysis

Task Name:	Work Over Water	

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	Click here to enter text.	**Control #:**	Click here to enter text.

Project Name:	Town of Hurley Landfill	Client:	NYSDEC	**Date:**	7/7/2025
Permits Required? (list):		**Work Location:**	1043 Dug Hill Rd, West Hurley, NY 12491		

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: _____ ☐ Hearing Protection ☐ Other: _____
Tools & Equipment:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1.	1a.		1a.	
On-Site Edits:				
2.	2a.		2a.	
On-Site Edits:				
3.	3a.		3a.	
On-Site Edits:				

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Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	Click here to enter text.	**Control #:**	Click here to enter text.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
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4.	4a.		4a.	
On-Site Edits:				
5.	5a.		5a.	
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

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Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

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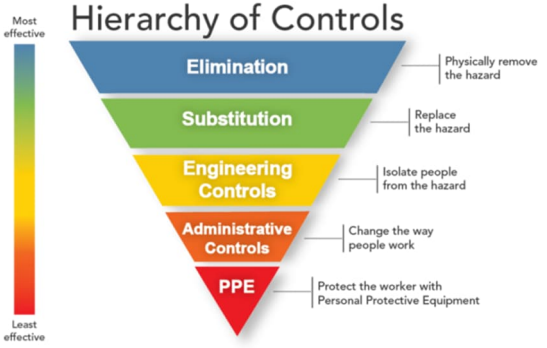
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Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics**. This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name:
Phone Number:

AECOM SH&E Rep. Name: Caroline Lee
Phone Number: 610-234-0407

Meeting Leader:

DCS Americas - This form may be replaced by the electronic Daily Tailgate Meeting Tool. Link - Ecosystem Daily Tailgate Meeting App Site

Date: 7/7/2025	**Project Name/Location:** Town of Hurley Landfill	**Project Number:** 60762183

Today's Scope of Work:

Muster Point Location:	**First Aid Kit Location:**	**Fire Extinguisher Location:**	**Spill Kit Location:**

1. Required Topics

- ☐ Fitness for Duty requirements, all sign in / sign out
- ☐ Required training (incl. task specific) completed and current
- ☐ SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- ☐ Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- ☐ STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- ☐ Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- ☐ Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- ☐ Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- ☐ Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- ☐ Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- ☐ Required checklists/records available, understood (describe):
- ☐ Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

☑ ■ **Check ☑ as reviewed or mark ■ as not applicable**

- ☐ ☐ Biological/ Chemical / Electrical Hazards
- ☐ ☐ Ergonomics - Lifting, Body Position
- ☐ ☐ Lock Out/ Tag Out
- ☐ ☐ Short Service Employees - visual identifier and mentor/ oversight assignment
- ☐ ☐ Simultaneous/ Neighbouring Operations
- ☐ ☐ Slip/ Trip/ Fall Hazards
- ☐ ☐ Specialized PPE Needs
- ☐ ☐ Traffic Control
- ☐ ☐ Waste Management/ Decontamination
- ☐ ☐ Weather Hazards / Heat Stress / Cold Stress
- ☐ ☐ Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- ☐ ☐ Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- ☐ ☐ Other Topics (describe/attach):
- ☐ ☐ Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	**Signature**	**Date** **Time** **(at end of day / shift)**

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
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(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

Discuss as Applicable and Modify THA as Needed

Check ☑ if reviewed or mark N/A

- ☐ *Biological / Chemical / Electrical Hazards*
- ☐ *Decontamination Procedures*
- ☐ *Ergonomics – Lifting, Body Position*
- ☐ *Lock Out / Tag Out*
- ☐ *Short Service Employees – visual identifier and mentor / oversight assignment*
- ☐ *Simultaneous / Neighboring Operations*
- ☐ *Slip / Trip / Fall Hazards*
- ☐ *Specialized PPE Needs*
- ☐ *Traffic Control*
- ☐ *Waste Management / Decontamination*
- ☐ *Weather Hazards / Heat Stress / Cold Stress*
- ☐ *Work Permit Requirements:* N/A
- ☐ *Other:*
  N/A

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Using the Matrix:

1. Identify basic steps of the task and associated hazards.
2. Calculate the initial risk rating.
3. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating.
4. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

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Attachment B

Applicable AECOM SHE Procedures

Attachment B: Applicable AECOM SHE Procedures

	Hazard/ Activity (Note: Text in this column links to procedure)	Applicable Procedure		Hazard / Activity (Note: Text in this column links to procedure)	Applicable Procedure
☐	Abrasive Blasting	S3AM-335-PR1	☐	Highway and Road Work	S3AM-306-PR1
☐	Aerial Work Platforms	S3AM-323-PR1	☐	Hoists Elevators and Conveyors	S3AM-343-PR1
☐	All-Terrain Vehicles	S3AM-319-PR1	☐	Hot Work	S3AM-332-PR1
☐	Blasting and Explosives	S3AM-336-PR1	☐	Ladders	S3AM-312-PR1
☒	Bloodborne Pathogens	S3AM-111-PR1	☐	Lockout Tagout	S3AM-325-PR1
☐	Cofferdams	S3AM-344-PR1	☐	Machine Guarding Safe Work Practice	S3AM-326-PR1
☒	Cold Stress	S3AM-112-PR1	☐	Marine Safety and Vessel Operations	S3AM-333-PR1
☐	Compressed Air Systems & Testing	S3AM-337-PR1	☒	Material Storage	S3AM-316-PR1
☒	Compressed Gases	S3AM-114-PR1	☐	Mine Site Activities	S3AM-341-PR1
☒	Concrete Work	S3AM-338-PR1	☐	Mining Operations	S3AM-345-PR1
☐	Confined Spaces	S3AM-301-PR1	☒	Non Ionizing Radiation	S3AM-121-PR1
☒	Corrosive Reactive Materials	S3AM-125-PR1	☐	Overhead Lines	S3AM-322-PR1
☐	Cranes and Lifting Devices	S3AM-310-PR1	☐	Powder-Actuated Tools	S3AM-327-PR1
☐	Demolition	S3AM-339-PR1	☐	Powered Industrial Trucks	S3AM-324-PR1
☐	Diving (scientific and commercial)	S3AM-334-PR1	☐	Radiation	S3AM-120-PR1
☒	Drilling, Boring & Direct Push Probing	S3AM-321-PR1	☐	Railroad Safety	S3AM-329-PR1
☐	Electrical Safety	S3AM-302-PR1	☒	Respiratory Protection	S3AM-123-PR1
☐	Excavation	S3AM-303-PR1	☐	Scaffolding	S3AM-311-PR1
☐	Fall Protection	S3AM-304-PR1	☐	Steel Erection	S3AM-340-PR1
☒	Flammable and Combustible Liquids	S3AM-126-PR1	☐	Temp. Floors, Stairs, Railings, Toe-boards	S3AM-342-PR1
☐	Gauge Source Radiation	S3AM-122-PR1	☒	Underground Utilities	S3AM-331-PR1
☒	Hand and Power Tools	S3AM-305-PR1	☐	Underground Work	S3AM-330-PR1
☒	Hazardous Waste Operations	S3AM-117-PR1	☒	Wildlife, Plants and Insects	S3AM-313-PR1
☒	Heat Stress	S3AM-113-PR1	☐	Working Alone	S3AM-314-PR1
☒	Heavy Equipment	S3AM-309-PR1	☒	Working On and Near Water	S3AM-315-PR1
☐	High Altitude	S3AM-124-PR1			

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Americas

Bloodborne Pathogens

S3AM-111-PR1

1.0 Purpose and Scope

1.1 Define the AECOM procedures for eliminating and/or controlling occupational exposure to Bloodborne Pathogens on AECOM projects and activities.

1.2 A written Exposure Control Plan shall be developed and implemented during all AECOM operations where there is a reasonable potential for occupational exposure of AECOM employees and/or subcontractors to bloodborne pathogens as a regulated waste.

1.3 This procedure's requirements apply to all AECOM Americas employees and operations and any other entity and its personnel contractually required to comply with this document's content. Any jurisdictional requirements exceeding those identified in this procedure shall be met when conduction work in the given jurisdiction.

2.0 Terms and Definitions

2.1 **Blood** – Human whole blood; human blood components such as plasma or platelets; and human blood products such as clotting factors.

2.2 **Bloodborne Pathogens (BBP)** – Pathogenic microorganisms that are present in human blood and that can infect and cause disease in persons who are exposed to blood containing these pathogens including but not limited to hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, human T-lymphotropic virus Type I, and viral haemorrhagic fever (Ebola).

2.3 **Exposure Control Plan** *(S3AM-111-ATT1)* – A plan that addresses the requirements applicable to specific AECOM projects and activities designed to eliminate or minimize employee exposure. The Exposure Control Plan shall be incorporated into the location specific SH&E Plan and shall be accessible to all employees. The Exposure Control Plan shall include:

- Exposure determination.
- The schedule and method of implementation for:
  - Methods of compliance;
  - Hepatitis B Vaccination;
  - Post exposure Evaluation;
  - Communications of Hazards to employees; and
  - Record Keeping.
- Documentation methods for exposure incidents, to include:
  - Routes of exposure; and
  - The circumstances for which and exposure incident occurred.

Note: In the State of California this plan shall also address exposures to airborne pathogens.

2.4 **SH&E Plan** – A document prepared for a specific project or program that details the hazards, precautions, emergency planning, medical, and training requirements for that project or program.

2.5 **Occupational Exposure (Exposed) –** Reasonably anticipated skin, eye mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. Employees will be considered to be potentially exposed, even though they are using the universal precautions specified for the project or program.

2.6 **Other Potentially Infectious Materials (OPIM)** – Body fluids and tissues including: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, saliva, and any other body fluid that is visibly contaminated with blood. When it is difficult or impossible to differentiate between body fluids, all body fluids should be treated as if they are potentially infectious.

Note: In the State of California airborne pathogens are also considered infectious materials.

2.7 **Regulated Waste** – (1) liquid or semi-liquid blood or other potentially infectious materials; (2) contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; (3) items that are caked with dried blood or other potentially infectious materials and are capable of being released during handling; (4) objects contaminated with blood that can pierce the skin; and (5) pathological and microbiological wastes containing blood or other potentially infectious materials.

2.8 **Source Individual** – An individual, typically one who has been injured, whose blood or saliva has come in contact with another individual, typically one who has rendered first aid or Cardio Pulmonary Resuscitation (CPR) to the injured party.

2.9 **Universal Precautions** – All body fluids and materials potentially contaminated by body fluids will be considered to be infectious unless the fluids were from the person performing the clean up or decontamination activities. All employees coming in contact with another person's body fluids shall assume that the fluids are infectious and shall wear prescribed Personal Protective Equipment.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3AM-017-PR1 Injury & Illness Recordkeeping

3.4 S3AM-128-PR1 Medical Screening & Surveillance

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Occupational Health Manager**

- Will review and maintain all medical records generated as a result of post-exposure follow-up and maintain all medical records related to the follow-up.
- Will, where appropriate, consult with AECOM's local medical providers about follow-up recommendations.

4.1.2 **SH&E Manager**

- Will review project / program-specific Exposure Control Plans (normally part of the SH&E Plan) prior to the initial mobilization, at least annually for continuing projects or programs, and whenever necessary to reflect modified tasks or procedures that affect occupational exposure to bloodborne pathogens.
- Will consult with the Occupational Health Manager regarding all bloodborne pathogens exposure incidents.
- Will maintain training records and post-exposure follow-up information.
- Will confirm that site-specific training is conducted for all employees working at sites where regulated wastes were disposed or for employees who may be occupationally exposed while working at a facility that handles regulated wastes.

- Will confirm the Hepatitis B vaccine is made available to all employees with a potential occupational exposure (e.g. paramedic, medical laboratory employee, etc.).
- Will review all incident reports and arrange for post-exposure follow-up with AECOM's local medical provider.
- Will offer recommendations on how to prevent an incident from recurring.

4.1.3 **Manager**

- See that all recommendations made by the SH&E Manager are implemented.
- Support the SH&E Manager in their efforts to prevent occupational and non-occupational exposures to bloodborne pathogens.

4.1.4 **Employee**

- Use all PPE and universal precautions required to prevent exposure to infectious materials.
- Follow the exposure control methods outlined in their Exposure Control Plan.
- Report potential exposure incidents to their Supervisor or Manager immediately.

4.2 Potential Exposure Situations

4.2.1 There are a few activities within AECOM where potential occupational exposures to blood or other potentially infectious materials are of concern. These activities may include:

- Investigations of properties that received regulated wastes.
- Site visits or audits at Treatment Storage and Disposal facilities where medical waste is handled.
- Site visits or audits at medical or health care facilities.
- The provision of first-aid or cardiopulmonary resuscitation (CPR) to AECOM, subcontractor, or client personnel (if the action is part of the employee's occupations duties [e.g. paramedic] and not provided as a voluntary action).

4.2.2 Although AECOM does offer first-aid and CPR training to its employees on a regular basis, providing such aid is often on a voluntary basis and not directed by AECOM. As such, potential exposures may not be considered occupational exposures within the context of the OSHA Bloodborne Pathogens Standard. Site-specific Exposure Control Plans shall differentiate voluntary first-aid duties from occupational exposures as a component of the exposure determination. Refer to *S3AM-209-PR1 Risk Assessment & Management.*

4.3 Unforeseen Exposure Situations

4.3.1 Occasionally, potentially infectious material is encountered during a activity where none was expected; when this happens, the work shall be stopped, employee training conducted, and an exposure control plan prepared prior to resuming activities with potential exposures.

4.4 Employee Training

4.4.1 All personnel who will work on projects or programs which involve potential contact with regulated wastes will be required to attend a training class prior to the start of the project or program and annually for continuing projects or programs. Refer to *S3AM-003-PR1 SH&E Training.* The specific requirements and provisions of the written Exposure Control Plan shall be provided to each AECOM Employee and subcontractor assigned to work at the program / project.

4.4.2 Either of the following two sources of employee training will be used by AECOM to educate Employees on the hazards of exposure to bloodborne pathogens:

- The local chapter of the American Red Cross or other recognized training provider.
- AECOM's in-house training program.

4.4.3 Training sessions will review the following:

- Requirements of OSHA's Bloodborne Pathogens Standard or equivalent, applicable jurisdictional requirements.
- Review of AECOM's Bloodborne Pathogen Procedure (this document).
- Situations within AECOM that may involve exposure to bloodborne pathogens.
- Bloodborne diseases and symptoms of disease.
- Means of transmission.
- Work practice controls to reduce risk.
- Use of personal protective equipment to reduce risk.
- Incident reporting.
- AECOM's Post-Exposure Medical Follow-Up Procedures:

4.4.4 When contracting for CPR and first-aid training sessions, AECOM will request that each session include a section on the hazards associated with exposure to bloodborne pathogens and protective measures that shall be followed when administering first aid, CPR, or other emergency medical care. At the end of the session, Employees will be provided with a copy of this procedure. This procedure will be reviewed and a question-and-answer session will be conducted at the end of the presentation.

4.4.5 If the training provider cannot provide such training, AECOM will conduct a Blood Borne Pathogen training session prior to the start of the first aid or CPR class.

4.4.6 AECOM has and will have little control over employees who have not received AECOM provided first aid or CPR training, but who choose to perform Good Samaritan acts. Any Employee who does perform a Good Samaritan act that results in exposure to blood or other potentially infectious materials will, however, be provided with post-exposure medical follow-up as described in this procedure.

4.5 Personal Protective Equipment

4.5.1 All body fluids and materials potentially contaminated by body fluids will be considered to be infectious. All Employees coming in contact with another person’s body fluids shall assume that the fluids are infectious and shall wear prescribed personal protective equipment (PPE), refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.5.2 The use of PPE to prevent exposure is more appropriate for the types of occupational and non-occupational exposures Employees might encounter than is the use of engineering or work practice controls that are more effectively instituted in medical care or laboratory facilities where employees are actually handling blood and other potentially infectious materials.

4.5.3 PPE such as Tyvek coveralls, shoe covers, and gloves will be provided to all field team members involved in site activities where regulated wastes may be present. Site-specific PPE requirements will be identified in the written Exposure Control Plan. The same type of PPE will also be available, if it is deemed necessary, for Employees involved with activities at TSD facilities that handle regulated wastes.

4.5.4 PPE will be provided to affected Employees at no cost.

4.6 Universal Precautions Kits

4.6.1 In those work areas where there is the potential for exposure to infectious materials, a universal precaution kit shall be readily available. The kit shall permit the clean-up, neutralization, transportation, and disposal of up to 1 litre of blood or body fluids. The kit shall contain the following items at a minimum:

- Safety shield/mask combination
- Liquid proof apron
- Medical-grade vinyl/nitrile gloves
- Liquid solidifier/deodorizer
- Pickup scoop with scraper
- Red biohazard waste bag with tie
- Germicidal solution with dry wipe
- Antimicrobial hand wipe
- ID tag
- Instructions for use

4.7 Personal Hygiene

4.7.1 Special provisions will be made so that hand washing facilities are available on-site for sites that are known to be contaminated with regulated wastes. Alcohol wipes will be available in the event that hand washing facilities are not immediately available.

4.7.2 To reduce the potential for infection, if skin contact with blood or other potentially infectious materials occurs, the exposed area should be washed with non-abrasive soap and water as soon as possible. Hand washing will also help to prevent the transfer of contamination from the hands to other areas of the body or other surfaces that may be contacted later. Even when protective gloves are worn, hands should be washed with non-abrasive soap and running water as soon as possible after the gloves are removed.

4.7.3 The use of an alcohol wipes should not be relied upon as the primary means of personal hygiene. Hands should be thoroughly washed with soap and running water as soon as possible.

4.7.4 If mucous membranes, such as the eyes, come in direct contact with blood or other potentially infectious materials, the area should be washed or flushed with water as soon as possible and reported immediately.

4.8 Reporting Exposure Incidents

4.8.1 All incidents in which an employee has been exposed to blood or other potentially infectious materials shall be reported to the employee's Supervisor and to the SH&E Manager immediately. An IndustrySafe on-line report shall be completed in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*. After reviewing the report, the SH&E Manager will provide recommendations, when appropriate, for preventing recurrence of the incident.

4.9 Medical Follow-Up to Exposure Incidents

4.9.1 Once notified, the SH&E Manager will in turn discuss the incident with AECOM's Occupational Health Manager and/or medical provider and make arrangements for an evaluation, refer to *S3AM-128-PR1 Medical Screening & Surveillance*. Prompt medical attention is important in the event of an exposure incident. If the incident occurs in the field, the Employee will either be asked to visit the local hospital or, if he/she chooses, return immediately to the office to visit AECOM's local medical provider.

4.9.2 An attempt will be made to test the affected employee, and if applicable, the source individual's blood, for bloodborne pathogens. No testing will be performed without the written consent of the exposed Employee or the source individual. If initially, the exposed Employee or the source individual does not consent to HIV serological testing, but does consent to HBV serological testing, AECOM will make provisions with the local medical provider to preserve the blood sample for at least 90 days in the event that after counselling efforts, the Employee voluntarily consents to HIV testing.

4.9.3 AECOM will rely on the professional judgment of its Occupational Health Manager and/or local medical providers in the event of an exposure incident. Evaluations and follow-up procedures will be provided according to the recommendations of the United States Public Health Service (USPHS), World Health Organization, or other Public Health organization in Canada and other countries in the Americas current at the time these evaluations and procedures take place. Minimally, a post-exposure evaluation and follow-up will include the following elements:

- Documentation of the route(s) of exposure
- Circumstances under which the exposure incident occurred
- Identification and documentation of the source individual in the case of first aid or emergency medical treatments
- Collection and testing of source individuals and exposed employee's blood for HBV and HIV serological status as soon as feasible and upon consent
- Post-exposure vaccination when medically indicated, as recommended by the USPHS
- Counselling, if necessary
- Evaluation of reported illnesses

4.9.4 Any and all follow-up recommendations offered by the physician will be immediately instituted by the SH&E Manager with the guidance of the Occupational Health Manager and/or the local medical provider and at no cost to the affected Employee. Repeat testing, counselling, and follow-up, if recommended, will also be provided at no cost to the Employee. AECOM will rely on the Occupational Health Manager and/or the local medical provider to provide counselling to Employees concerning infection status, including results of and interpretation of medical tests and advising the Employee about the protection of personal contacts.

4.9.5 All medical providers shall submit to AECOM's Occupational Health Manager and the affected Employee a written opinion of the post-exposure evaluation within 15 days of the completion of the evaluation.

4.9.6 All medical records generated as a result of the post-exposure evaluation will be retained in the office of the Occupational Health Manager, and as applicable AECOM's medical services provider, under lock and key and will be maintained with the strictest confidentiality. Refer to *S3AM-017-PR1 Injury & Illness Recordkeeping.*

4.10 Hepatitis Vaccination

4.10.1 Prior to performing site visits or field investigations where regulated wastes are stored, processed, or known to have been disposed of, AECOM will consult with the Occupational Health Manager and/or the local medical providers to determine if a hepatitis A or B vaccination is appropriate given the site conditions and the proposed scope of work. Where possible the first Hepatitis B vaccinations will be given prior to working at sites with known, potential occupational exposures.

4.10.2 Although AECOM does offer first-aid and CPR training to its Employees on a regular basis, providing such aid is often voluntary and not as a specified job duty of an Employee. As such, potential exposures may not be considered occupational within the context of the government Bloodborne Pathogens Standard. Pre-exposure hepatitis vaccinations will not typically be offered for voluntary roles.

4.10.3 Post-exposure hepatitis vaccination will be offered to Employees involved in an exposure incident within 24 hours of possible exposure.

4.10.4 The vaccinations discussed above shall be provided to Employees at no cost if required by the exposure determination.

4.11 Housekeeping

4.11.1 Other than through the provision of first aid or CPR, there is no potential for occupational exposure to blood or other potentially infectious materials within any of the AECOM offices. Therefore, the housekeeping requirements and requirements for warning signs and labels contained in the OSHA Bloodborne Pathogens standard are not applicable to our office operations.

4.11.2 When working at a site where regulated wastes have been disposed of, the specific housekeeping and warning sign requirements will be prescribed by the client and/or in the site-specific HASP.

4.11.3 When working at a client's facility, AECOM will review the facilities plan for compliance with all the requirements of the Bloodborne Pathogens Standard and will observe all housekeeping requirements, wear required PPE, and acknowledge all warning signs and labels as specified in the client's plan. If the client does not have an effective plan, AECOM will prepare a plan as part of the written Exposure Control Plan.

4.12 Regulated Waste Generated by AECOM

4.12.1 Any regulated waste generated by AECOM as a result of first aid activities or clean-up of potentially infectious material will be collected in sealed, watertight containers and disposed of according to the Host Employer's BBP program or disposed of through a permitted regulated waste facility.

4.12.2 Disposal manifests shall be maintained in accordance with local or governmental regulations.

4.13 Material Decontamination

4.13.1 Any areas or equipment that are contaminated by potentially infectious material will be decontaminated using a 10% solution of household bleach. Utilize appropriate personal protective equipment to control exposure to the bleach (e.g. safety goggles, gloves, etc.). Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.14 Procedure and Plan Review

4.14.1 All Exposure Control Plans for projects or programs extending over one year shall be reviewed annually by the SH&E Manager and affected Employees.

5.0 Records

5.1 Each SH&E Manager will maintain records and provide copies of the records to the Occupational Health Manager, related to bloodborne pathogens in accordance with the provisions of the standard and *S3AM-017-PR1 Injury & Illness Recordkeeping.*

5.2 Records maintained in accordance will include bloodborne pathogens exposure incidents, post-exposure follow-up, vaccination status, and training for all Employees with potential occupational exposure.

5.3 Employee medical and training records required by this procedure shall be provided upon request for examination and copying to the Employee, to anyone having written consent of the subject employee, or to State, Province, or Federal Occupational Safety and Health regulatory agencies.

6.0 Attachments

6.1 S3AM-111-ATT1 Bloodborne Pathogens Exposure Control Plan

6.2 S3AM-111-FM1 Hepatitis B Vaccination Declination

Americas

Bloodborne Pathogens Exposure Control Plan

S3AM-111-ATT1

1.0 Introduction

Employees are at risk for exposure to and possible transmission of infectious diseases each time they are in contact with blood or body fluids. Bloodborne pathogens are microorganisms present in human blood and other body fluids that can cause serious disease in humans and include, but are not limited to Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Human Immunodeficiency Virus (HIV). Therefore, this exposure control plan (ECP) has been established to ensure that employees are effectively informed concerning potential workplace health hazards, and that protective measures necessary to eliminate or minimize bloodborne exposure incidents are used whenever possible.

2.0 Exposure Determination

2.1 The Medical Screening Evaluation form will be used to evaluate which employees may incur occupational exposure to blood or other potentially infectious materials when performing routine tasks and procedures. Refer to *S3AM- 128-PR1 Medical Screening & Surveillance*. These exposure determinations will be made without regard to the use of personal protective equipment, and regardless of exposure frequency.

2.1.1 The employees in the following job classifications may have occupational exposure to bloodborne pathogens, and are covered by this program:

- Occupational health nurse
- Paramedics
- Registered nurses
- Designated first aid providers (providing first aid identified as part of the employee's occupational duties and not a voluntary action)
- Medical laboratory employees
- Janitorial workers in medical facilities and clinics.

2.1.2 Tasks and procedures that may expose the above employees to bloodborne pathogens include:

- Treating cuts, abrasions, and burns
- Cleaning contaminated environmental surfaces
- Administering cardiopulmonary resuscitation (CPR).

3.0 Exposure Control

3.1 "Universal precautions" are a required method of control to prevent exposure to blood and body fluids. This term refers to the concept that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, HCV, and other bloodborne pathogens, regardless of the perceived risk status of another individual. Universal precautions apply to blood, other body fluids containing visible blood, semen, and vaginal fluids. Universal precautions do not apply to feces, nasal secretions, saliva, sweat, tears, sputum, urine, and vomitus unless they contain visible blood. Although these fluids have an extremely low or nonexistent risk for bloodborne pathogens, they are a potential source for other infectious diseases, and precautions shall also be followed when these body fluids are present.

3.2 Engineering and Work Practice Controls

3.2.1 The following engineering controls will be in place in all areas of occupational exposure:

- Containers for disposable contaminated sharps shall be puncture-resistant, labeled a biohazard, leak-proof, and have a closable top.

- Containers for storage, transport, or shipment of blood or other potentially infectious materials, regulated waste, and contaminated laundry will be labeled with the biohazard symbol and site address, and have a securely closing lid.
- Engineering controls will be reviewed and maintained on a regular basis to ensure effectiveness.

3.2.2 The following work practice controls (administrative and personal protective equipment) shall be strictly followed to minimize exposure, and isolate or remove bloodborne pathogens from the workplace:

- Accessible handwashing facilities. If soap and running water are not available, an antiseptic hand cleaner in conjunction with clean paper towels or antiseptic towelettes are acceptable temporary alternatives to running water. When this alternative method is used, employees shall wash their hands with soap and running water as soon as feasible.
- Personal protective equipment (PPE) will be provided at no cost to the employee, and will be chosen based on the anticipated exposure to blood. PPE is considered appropriate if it does not permit blood or other potentially infectious materials to reach or pass through clothes, skin, or mucous membranes of the eyes or mouth under normal conditions of use, and for the duration of time the equipment will be used. PPE shall be readily accessible and will be removed prior to leaving the work area.
- Disposable single-use gloves shall be used as a protective barrier in all situations in which contact with body fluids is anticipated. Gloves of the correct size will be provided. Disposable gloves will not be washed or disinfected for reuse, and will be replaced between employees, and if they become torn or punctured. Gloves are especially important if the employee has cuts, abraded skin, chapped hands, or dermatitis.
- Liquid-impermeable gowns, boots, and masks, in combination with eye-protective devices such as goggles and shatterproof glasses with solid-side shields or chin-length face shields, shall be worn whenever splashing, spraying, or spattering of blood droplets or body fluids can be reasonably anticipated.
- Disposable pocket mask ventilation devices shall be provided in all first aid kits and used to avoid mouth-to-mouth contact during emergency cardiopulmonary resuscitation.
- Examples of Recommended PPE (depending on task, more PPE may be needed).

Task	Gloves	Gown	Mask	Goggles
Bleeding control w/ minimal bleeding	Yes	No	No	No
Bleeding control w /spurting blood	Yes	Yes	Yes	Yes
Cardiopulmonary resuscitation	No	No	Yes	No
Decontamination/clean-up	Yes	No	No	No
Medical laboratory activities	Yes	Yes	Yes	Yes

3.2.3 Eating, drinking, smoking, applying cosmetics, and handling of contact lenses is prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and drink cannot be kept in refrigerators, freezers, shelves, cabinets, or on counter tops where blood or body fluids are present.

3.2.4 Contaminated needles and other sharps shall not be bent or recapped unless a one-handed technique is used. They shall be disposed of in an appropriate sharps container.

3.2.5 All regulated biohazardous waste will be placed in a waste receptacle that has designated red biohazard bags and a closable top controlled by a foot peddle. When full, the bags shall be removed with gloved hands, tied off, and placed in a biohazard shipping carton, to be held for pick-

up. If any biohazard bag appears to be leaking, it shall be double-bagged. The waste will be incinerated per federal, provincial/territorial/state regulations.

3.3 Housekeeping

3.3.1 Universal precautions shall be used when cleaning or decontaminating any surface or equipment that may be contaminated. Appropriate PPE shall be used for protection during decontamination.

3.3.2 All contaminated environmental work surfaces such as countertops or floors will be cleaned according to regulatory requirements or with a household bleach solution diluted 1:10 with water directly following contamination with blood or body fluids.

3.3.3 Instruments such as tweezers, bandage scissors, and thermometers shall be disposable rather than reusable equipment, and shall be disposed of in an appropriate manner.

3.3.4 Broken, contaminated glassware shall not be picked up directly with the hands. It shall be cleaned up using a mechanical means such as a brush and dustpan or tongs.

4.0 Hepatitis B Vaccination

4.1 Within 10 working days of placement, all employees assigned to tasks with potential occupational exposure to bloodborne pathogens shall be offered the Hepatitis B vaccination at no cost to the employee, unless the employee has had a previous Hepatitis B vaccination series, antibody testing reveals the employee is immune, or the vaccine is contraindicated for medical reasons. Further, this vaccination series shall be made immediately available to employees who have an occupational exposure, whether as a result of their assigned tasks, or occurring from an incidental contact.

4.2 The local occupational medical facility used for routine medical surveillance will administer the vaccinations.

4.3 Employees who decline the Hepatitis B vaccine shall sign a copy of the waiver form located at the end of this Work Instruction. The signed waiver will be stored in the employee's medical record with the Occupational Health Manager. Employees may initially decline the vaccination, but may decide to take them at a later date, while still covered under this plan. The vaccinations will be made available to the employee at that time.

4.4 Employees choosing to take the vaccination series will sign a consent form at the occupational clinic prior to receiving the injections, and are advised to read the package insert regarding the efficacy, safety, method of administration, and benefits of the vaccine. Employees may also ask questions directly of the Medical Service Provider or local occupational physician. Employees are not required to participate in a prescreening program (to determine immunity) before receiving the vaccinations. If a routine booster of Hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) will be made available to affected employees.

5.0 Post-Exposure Incident Evaluation And Follow-Up

5.1 All occupational bloodborne pathogen exposures shall be reported to the HSE representative and Occupational Health Manager immediately after initial decontamination first aid is accomplished. Following the report of an exposure incident, a confidential medical evaluation with an occupational physician will be arranged as soon as possible, ideally no later than 1 to 2 hours after the incident has occurred. In some jurisdictions, depending on applicable workers' compensation law, employees may choose treatment from their personal physician. A copy of the OSHA Bloodborne Pathogen Standard, if applicable to the jurisdiction, will be provided if the physician does not have a copy. A written incident report shall be completed as soon as possible, fully describing the incident.

5.2 First aid protocol for treatment immediately after an exposure incident:

5.2.1 Lacerations, punctures, and abrasions should be washed under cool running water for at least 5 minutes, allowing free bleeding. Cleanse area well with soap or iodine solution. Apply sterile dressing as needed. Give tetanus booster if indicated (7 to10 years since last booster).

5.2.2 Ocular exposure requires irrigation of the eye with water or sterile normal saline solution for 15 minutes.

5.2.3 Mucous membrane exposure requires rinsing mouth with ½ strength 3 percent hydrogen peroxide for 30 seconds, four separate and consecutive times.

5.3 Confidential Medical Evaluation

5.3.1 The treating occupational physician will receive documentation of the routes of exposure, the circumstances surrounding the incident, and identification of the source individual (the individual the employee was exposed to). The blood of the source individual will be tested if possible, and after consent is obtained. When legally permissible, results of the source individual's tests will be made available to the exposed employee, with the exposed employee informed about the applicable laws and regulations concerning the disclosure of the identity and infectivity of the source individual.

5.3.2 Testing of the exposed employee's blood, if consented to (the employee may consent to baseline blood collection, but may request that the sample not be tested for HIV for up to 90 days, if at all), is recommended.

5.3.3 Post-exposure medical treatment will be offered in accordance with the current recommendations of the U.S. Public Health Services. This may include, but is not limited to:

- A series of HIV post-exposure blood tests
- Hepatitis B vaccination and/or Hepatitis B immune globulin
- HIV post-exposure prophylactic medications
- Evaluation of acute febrile illnesses following exposure
- Employee counseling concerning precautions to take during the period after the exposure incident, and information on signs and symptoms of potential illnesses.

5.4 Healthcare Professional's Written Opinion

5.4.1 The Occupational Health Manager shall obtain and provide the employee with a copy of the evaluating physician's written opinion within 15 days of the completion of the medical evaluation. A copy will be maintained in the employee's confidential medical record. The written opinion shall be in accordance with the requirements of the OSHA Bloodborne Pathogens Standard indicating that the employee has been informed of any medical conditions resulting from exposure that require further evaluation or treatment. All other findings or diagnoses shall remain confidential and will not be included in the report.

6.0 Hazard Communication

6.1 Fluorescent red or orange-red warning labels bearing the universal biohazard symbol and the legend BIOHAZARD shall be firmly affixed to all containers (e.g., waste cans, sharps containers, and refrigerators) used for the storage or shipment of blood or other potentially infectious materials.

6.2 All employees designated to perform tasks involving occupational exposure shall receive bloodborne pathogens training at the time of initial assignment to the job. This training will be given during working hours and at no cost to employees. Refresher courses will be provided annually (within 1 year of previous training), and if new tasks or procedures are implemented. Material appropriate in content and vocabulary to education level, literacy, and language of the employees shall be used for all required training.

6.3 Training will include: making accessible a copy of the regulatory text of the standard and explanation of its contents, general discussion on bloodborne diseases and their transmission, exposure control plan, engineering and work practice controls, personal protective equipment, Hepatitis B vaccine, response to emergencies involving blood, how to handle exposure incidents, the post-exposure evaluation and follow-up program, signs/labels/color-coding, and question and answer time with the trainer.

7.0 Exposure Incident Investigation

7.1 The SH&E Manager will review the circumstances of any exposure incident to determine corrective actions. The incident report will include:

7.1.1 Engineering controls in use at the time

7.1.2 Work practices followed

7.1.3 A description of any equipment being used

7.1.4 A description of the work being performed

7.1.5 PPE that was used at the time of the incident

7.1.6 Date, time, and location of the incident

7.1.7 Employee's training.

7.2 An incident report shall be completed within four hours of the incident and entered into AECOM's on-line incident reporting system (e.g., IndustrySafe) in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigations*. A copy of this incident report will be forwarded to the Occupational Health Manager, who will evaluate what follow-up actions should be addressed, including if revisions need to be made to the Exposure Control Plan.

8.0 Recordkeeping

8.1 The Occupational Health Manager will be responsible for establishing and maintaining accurate, confidential workers' compensation medical records for each employee with occupational exposure for the duration of employment plus 30 years, in accordance with OSHA 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records.

8.2 The SH&E Manager will be responsible for maintaining the bloodborne pathogens training class records for at least 3 years from the date of training. The records will include the date of the training class, a summary of the class contents, the names of the qualified instructors, and the names and job titles of personnel attending the training.

8.3 Employee medical records shall be made available to employees (or their designated representative) with written consent by the employee within 15 working days of request.

8.4 An exposure incident will be evaluated by the Occupational Health Manager and SH&E Manager to determine if the case meets OSHA's Recordkeeping Requirements (29 CFR 1904).

Americas

Hepatitis B Vaccination Declination

S3AM-111-FM1

I understand that due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring Hepatitis B virus (HBV) infection.

I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself; however, I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease.

If, in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with the Hepatitis B vaccine, I can receive the vaccine series at no cost to me.

Name: _____

Date: _____

Witness: _____

Date: _____

Americas

Cold Stress

S3AM-112-PR1

1.0 Purpose and Scope

1.1 To protect employees from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all employees can be repeatedly exposed without adverse health effects.

1.2 This procedure applies to all AECOM Americas based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, working outdoors in damp and cool (below 50 degrees Fahrenheit [°F] or 10 degrees Celsius [°C]) conditions or anytime temperatures are below 32°F or 0°C.

2.0 Terms and Definitions

2.1 **Cold Stress** – The production of physiological effects due to cold temperatures and\or wind chill.

2.2 **Equivalent Chill Temperature (ECT)** – Also known as Wind Chill (see below).

2.3 **Frostnip** – Superficial cooling of tissues without cellular destruction.

2.4 **Frostbite –** Freezing of tissue, resulting in tissue destruction.

2.5 **Hypothermia –** Condition of reduced core body temperature to 95ºF (35ºC) resulting in loss of dexterity, loss of mental alertness, collapse, and possible death.

2.6 **Wind Chill –** The combined effect of air temperature and wind. Also expressed as "equivalent chill temperature" (ECT), wind chill is defined as heat loss resulting from the effects of air temperature and wind velocity upon exposed skin.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-128-PR1 Medical Screening & Surveillance Program

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-314-PR1 Working Alone

3.5 S3AM-315-PR1 Working On or Near Water

3.6 S3AM-333-PR1 Marine Safety & Vessel Operations

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Ensuring the safety of employees on their project sites, consistent with regulatory standards.
- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign employees physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating employee capability.

- Confirm employees are properly trained to recognize the symptoms of cold stress.

4.1.2 **Safety, Health and Environment (SH&E) Manager**

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.
- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.1.3 **Supervisor**

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that employees are physically capable of performing the assigned tasks and are not in a physically compromised condition.

4.1.4 **Employee**

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly rested condition.
- Report all suspected cold stress-related illnesses.

4.2 Requirements

4.2.1 Carefully plan work anticipated to be performed in cool or cold conditions. If possible, heavy work should be scheduled during the warmer parts of the day or when the wind is most calm. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.

4.2.2 Staff working in extreme cold (wind chill or ECT below 10ºF or -12ºC) shall not work alone. The Buddy System shall be utilized to keep an eye on each other and to watch for signs of cold stress. Refer to *S3AM-314-PR1 Working Alone*. Watch for symptoms and signs of hypothermia

4.2.3 Monitor weather forecasts and weather conditions such as ambient temperature, wind speed, and precipitation. Use observations prior to entering and while in the field to ensure appropriate protections are in place:

- If possible, move the work to a warm location.
- If possible and as applicable, erect shelters or screens around the work area.
- If possible, heat the work area.
- If possible, adjust schedule according to the cold conditions, work level and worker acclimatization.
- Implement a work-warming regimen by taking breaks out of the cold. As applicable, consult *S3AM-112 ATT1 Temperature Thresholds* to determine wind chill and work-warming schedule.
- Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure to the cold. If shelter is not readily available, consider supplying temporary shelters.

- Provide assistance to prevent body heat loss, such as:
  - Providing appropriate sources of heat (e.g. warm packs, portable heaters, etc.).
  - Use of insulating materials on equipment handles when temperatures drop below 30°F (-1°C).

4.2.4 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frostbite; refer to *S3AM-112-ATT2 Symptoms & Treatment*:

- Ensure appropriate PPE requirements are established and adhered to.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Because prolonged exposure to cold air or to immersion in cold water at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection shall be used.
- Eat high calorie snacks to help maintain body metabolism.
- Confirm extra blankets or sleeping bags are on-site.
- Drink plenty of warm liquids. It is easy to become dehydrated in cold weather.
- Avoid caffeine and alcohol, which can act as diuretics. Alcohol consumption, depending upon quantity, can dilate blood vessels enhancing body heat loss or constrict blood vessels decreasing heat delivery to extremities.
- NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.
- If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist, refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3 Training

Before they begin work in a cold environment, employees that might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. Employees that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress, refer to *S3AM-003-PR1 SH&E Training*. Employees potentially exposed to cold stress will receive training including, but not limited to:

4.3.1 Sources of cold stress, the influence of protective clothing, and the importance of acclimatization.

4.3.2 How the body loses heat.

4.3.3 Recognition of cold-related illness symptoms.

4.3.4 Cold stress preventative/corrective measures including, but not limited to:

- Weather monitoring.
- Proper eating and drinking practices.
- Work-warming schedules and proper re-warming techniques.
- Buddy system.
- Safe cold work practices appropriate to the work that is to be performed.
- Proper use of cold environment personal protective clothing.

4.3.5 The harmful effects of excessive alcohol consumption in a cold stress environment.

4.3.6 The hazards associated with unstable snow or ice build ups.

4.3.7 First aid procedures for symptoms related to cold stress.

4.4 Personal Protective Equipment (PPE)

Wearing the right clothing is crucial to avoiding cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. Adequate insulating dry clothing will be required in air or wind chill temperatures below 40 °F (4.4°C)

All PPE will comply with the requirements of *S3AM-208-PR1 Personal Protective Equipment* and consider the following requirements:

4.4.1 Wear at least 3 layers of clothing to help prevent cold stress. It is important to preserve the air space between the body and the outer layer of clothing to retain body heat.

- Wear a middle layer of down, wool, or similar materials to provide insulation.
- Avoid cotton, especially blue jeans.
- Wear an outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)
- Do not wear tight clothing. Loose clothing allows better ventilation.

4.4.2 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.

4.4.3 Wear a hat or hardhat liner. Up to 40 percent of body heat can be lost when the head is left exposed.

4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.

4.4.5 Wear insulated boots or other insulated footwear, and insulated gloves to help reduce the chance of frostbite.

4.4.6 Keep a change of dry clothing available in case work clothes become wet.

4.4.7 Eye and face protection for employees employed outdoors in a snow and/or ice-covered terrain should be supplied.

- Sunglasses (with UVA and UVB protection) and sunscreen should be used when there is a persistent combination of snow and direct sun.
- Special safety goggles to protect against blowing ice crystals and ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.
- Ensure face guards are used to protect skin in cold, windy conditions, including riding on an unshielded vehicle.

4.5 General Cold Stress Prevention Measures

4.5.1 In order to prevent hypothermia:

- Wear appropriate clothing and PPE as determined by the weather conditions.
- When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
    - Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
    - Next remove head gear and neck wrappings.
    - Then coats/parkas should be opened at the waist and sleeves.
    - Finally, layers of clothing should be taken off.
    - When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.

- Garments worn to keep out rain and spray should also allow water vapor to escape.
- Take advantage of heat from the sun and stay out of the wind as much as possible.
- Have available emergency shelter providing protection from wind and rain and insulation from the ground.
- Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
- Get adequate rest; conserve energy.
- Get adequate nutrition to replenish energy stores; rest after meals.
- Drink adequate fluids to avoid dehydration.
- If any project / location staff member shows signs of hypothermia, stop and treat him/her.

4.5.2 In order to prevent frost bite:

- Dress to prevent hypothermia and protect the feet and hands.
- Avoid obstruction of circulation by, for example, tight boots or tightly fitting clothing.
- Avoid nicotine (particularly cigarettes) and do not consume alcohol.
- Keep ears and nose covered and out of the wind.
- Frostbite of the corneas of the eyes can be prevented by protective goggles.
- Adopt a “buddy system” of constantly watching the faces of others in the party for white skin tissue, which is evidence of frostbite (frostnip).
- Practice constant personal vigilance for signs of trouble in one’s own fingers and toes; when in doubt, investigate thoroughly before it is too late.

4.5.3 Adequate, insulating dry clothing that will help maintain core temperatures above 96.8°F (37°C) shall be provided to employees if work is performed in air temperatures below 40°F (4.4°C). Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.

4.5.4 An Equivalent Chill Temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in *S3AM-112-ATT1 Temperature Thresholds*. Unless unusual or extenuating circumstances exist, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32°F (0°C) regardless of wind speed. However, older employees, those with circulatory problems and those with previous cold injuries require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions that should be considered.

4.5.5 Continuous exposure of skin should not be permitted when the air speed and temperature results in an ECT of –25°F (-32°C) or below.

4.5.6 At air temperatures of 40°F (4.4°C) or less, it is imperative that employees who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.

4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.

4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.

4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.

4.5.12 Confirm that employees carry fire starter materials if working in remote areas.

4.5.13 Supplies such as PPE, fuels, enclosures, de-icing, traction aids, warm drinks, and batteries will be specified by the SH&E Manager and/or the Manager and made available. These supplies will be inspected at least weekly during cold weather projects and replaced when necessary.

4.6 Cold Stress Prevention Measures for the Hands

4.6.1 Special protection of the hands is required to maintain manual dexterity for the prevention of accidents including, but not limited to the following:

- If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60ºF (15ºC), special provisions should be established for keeping the employees' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30ºF (-1º C).
- If the air temperature falls below 60ºF (15ºC) for sedentary work, 40ºF (4.4º C) for light work, or 20ºF (-6ºC) for moderate work, and fine manual dexterity is not required, employees should use gloves.

4.6.2 To prevent contact frostbite, employees should wear anti-contact gloves:

- When cold surfaces below 20°F (-6°C) are within reach, each employee should be warned to prevent inadvertent contact by bare skin.
- If the air temperature is 0°F (-18°C) or less, employees should protect their hands with mittens or appropriate gloves. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens or gloves.
- Ensure an adequate supply of dry gloves is available to replace wet gloves.

4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40ºF (4.4ºC). The employees should wear cold protective clothing appropriate for the level of cold and physical activity.

4.6.4 Additional Cold Stress Prevention Measures:

For work practices at or below 10ºF (-12ºC) ECT, the following will apply:

- The employee should be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
- New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.
- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the employee.
- The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The employee should be protected from drafts to the greatest extent possible.

4.6.5 Employees handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40ºF should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of “cryogenic fluids” or those liquids with a boiling point that is just above ambient temperature.

4.6.6 Trauma sustained in freezing or subzero conditions requires special attention, because an injured employee is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Hypothermia in Water

4.7.1 Loss of body heat heat to the water is a major cause of deaths in boating and working near water incidents. Often the cause of death is listed as drowning; however, the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around 2 to 3 degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE		EXHAUSTION	SURVIVAL TIME
32.5°F	(0°C)	Under 15 minutes	Under 15 to 45 minutes
32.5 to 40°F	(0 to 4°C)	15 to 30 minutes	30 to 90 minutes
40 to 50°F	(4 to 10°C)	30 to 60 minutes	1 to 3 hours
50 to 60°F	(10 to 16°C)	1 to 2 hours	1 to 6 hours
60 to 70°F	(16 to 21°C)	2 to 7 hours	2 to 40 hours
70 to 80°F	(21 to 27°C)	3 to 12 hours	3 hours to indefinite
Over 80°F	(27°C)	Indefinite	Indefinite

4.7.2 Some points to remember when water is a potential hazard:

- Wear a personal flotation device when drowning is a potential hazard. Refer to *S3AM-315-PR1 Working On or Near Water*, and *S3AM-333-PR1 Marine Safety & Vessel Operations*.
- If the water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading, or if a significant potential to fall in water exists).
- While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep the head out of the water. This will increase survival time.
- Keep a positive attitude about rescue. This will increase chances of survival.
- If there is more than one person in the water, huddling is recommended to conserve body heat.

4.7.3 If an employee or equipment is to work on ice and the water beneath the ice is or may be more than 3¼ feet (1m) deep at any point:

- Test the ice prior to commencing to ensure it will support the load to be placed on it. Ongoing testing may be necessary.
- If there is any risk of falling through the ice employees must wear personal protective equipment that will ensure buoyancy and protect against hypothermia at all times while on the ice.

4.8 Work-Warming Regimen

4.8.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below 19ºF (–7ºC), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The employees should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.

4.8.2 The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.

4.8.3 When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing should be loosened to permit sweat evaporation or a change of dry work clothing provided.

4.8.4 A change of dry work clothing should be provided as necessary to prevent employees from returning to the cold environment with wet clothing.

5.0 Records

5.1 Exposure assessments will be documented in the location's files.

6.0 Attachments

6.1 S3AM-112-ATT1 Temperature Thresholds

6.2 S3AM-112-ATT2 Symptoms & Treatment

Americas

Temperature Thresholds

S3AM-112-ATT1

1.0 Purpose and Scope

1.1 The following Tables 1 and 2 give apparent temperatures (wind chill of equivalent chill temperature [ECT]) for various combinations of wind and air temperature, as well as guidelines to the danger of skin exposure.

Table 1. Wind Chill Chart (C)

Actual Temp (°C)	Wind Speed in km/hour									
	8	16	24	32	40	48	56	64	72	80
	Ambient Temperature (°C)									
0	-2	-8	-11	-14	-16	-17	-18	-19	-19	-20
-5	-7	-14	-18	-21	-23	-25	-26	-27	-28	-28
-10	-12	-20	-25	-28	-31	-33	-34	-35	-36	-36
-15	-18	-26	-32	-35	-38	-40	-42	-43	-43	-44
-20	-23	-32	-38	-43	-46	-48	-50	-51	-52	-52
-25	-28	-38	-45	-50	-53	-56	-57	-59	-59	-60
-30	-33	-45	-52	-57	-61	-63	-65	-67	-67	-68
-35	-39	-51	-59	-64	-68	-71	-73	-75	-75	-76
-40	-44	-57	-65	-71	-75	-79	-81	-83	-83	-84
-45	-49	-63	-72	-78	-83	-86	-89	-90	-91	-92
-50	-54	-69	-79	-85	-90	-94	-96	-98	-99	-100

Note: A. Little Danger: if less than one hour of exposure to dry skin.
B. Danger: Exposed flesh freezes within one minute.
C. Great Danger: Flesh may freeze within 30 seconds.

*Source: *2014 Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio.*

Table 2. Equivalent Chill Temperature Chart (F)

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Chill Temperature (°F)									
Calm	50	40	30	20	10	0	-10	-20	-30	-20
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-24	-33	-46	-58	-70
15	36	22	9	-5	18	-32	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-75	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	35	-51	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Wind speeds >40 mph have little additional effect	LITTLE DANGER				INCREASING DANGER			GREAT DANGER		
	Trenchfoot and immersion foot may occur at any point on this chart.									

1.2 How fast a person's body cools in cold weather depends on: air temperature, wind speed, heat of the sun, and work being done.

1.2.1 The following Table 3 provides guidelines for establishing periods of work to warming break periods based on ambient temperature and wind speed for workers wearing dry clothing.

1.2.2 Notes following the Table take into account additional factor such as physical exertion, whether workers are acclimatized, etc.

Table 3. Work-Warming Schedule Guidelines

Air Temp. (Sunny Sky) °F	No Noticeable Wind		5 mph Wind (8 km/h)		10 mph Wind (16 km/h)		15 mph Wind (24 km/h)		20 mph Wind (32 km/h)		25 mph Wind (40 km/h)		Air Temp. (Sunny Sky) °C
	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	
above 5°	Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		above -15°
5° to -1°											100 min	2	-15° to -17°
0° to -4°									100 min	2	75 min	2	-18° to -20°
-5° to -9°							100 min	2	75 min	2	55 min	3	-21° to -22°
-10° to -14°					100 min	2	75 min	2	55 min	3	40 min	4	-23° to -25°
-15° to -19°			100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	-26° to -28°
-20° to -24°	100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work		-29° to -31°
-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work				-32° to -34°
-30° to -34°	55 min	3	40 min	4	30 min	5	Cease Work						-35° to -37°
-35° to -39°	40 min	4	30 min	5	Cease Work								-38° to -39°
-40° to -44°	30 min	5	Cease Work										-40° to -42°
-44° & below	Cease Work												-43° & below

Modified from ACGIH 2014 Threshold Limit Values for Chemical Substances and Physical Agents.

Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.

Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.

Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater than 50% overcast/clouds, apply the schedule for conditions two steps lower. These modifications are additive with any applicable modifications from Note 2.

Note 4: For wind speeds in excess of 25 mph (40 km/h), cease all nonemergency work when temperatures fall below 5^{o}F (-21°C).

Note 5: When the work involves riding on an unshielded vehicle or some other activity that generates wind, the number of breaks should be increases appropriately.

Note 6: If effective protection against the wind can be provided by shields or screens, work modifications or measures, then the work warm-up schedule for “No Noticeable Wind” would apply.

Note 7: If reliable weather reports are not available, use the following as a guide to estimate wind velocity:

- A 5 mph (8 km/h) wind will move a light flag
- A 10 mph (16 km/h) wind will fully extend the flag
- A 15 mph (24 km/h) wind will raise a newspaper sheet
- A 20 mph (32 km/h) wind will produce blowing and drifting snow.

Symptoms & Treatment

1.0 Cold Stress-related Illnesses

1.1 Frostbite

1.1.1 Frostbite is a localized cold injury characterized by freezing of the tissues with ice crystal formation. There are several degrees of damage. Frostbite can be categorized into:

- **Frost Nip or Initial Frostbite**: (1st degree frostbite) Characterized by blanching or whitening of skin.
- **Superficial Frostbite**: (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.
- **Deep Frostbite**: (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

1.1.2 Frostbite injury is almost always limited to the upper and lower extremities (finger and toes) or to such appendages as the ears, nose or cheeks.

1.1.3 Conditions conducive to frostbite include sub-zero temperatures, hypothermia, dehydration, obstruction of the blood supply to the extremities (by constricting clothing, especially on the feet or at the wrists or ankles), contact with cold metal, contact with organic liquids (such as gasoline or solvents that have been left outdoors in sub-zero temperatures), use of substances that cause vasoconstriction (such as smoking tobacco), or other injury or shock.

1.1.4 Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues.

1.1.5 Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

1.1.6 The first symptom of frostbite is an uncomfortable sensation of coldness and pain, followed by numbness. There may be tingling, stinging, or cramping. Ongoing symptoms of frostbite include:

- Sudden and complete cessation of cold or discomfort in affected fingers or toes, often followed by a pleasant feeling of warmth;
- Subsequently the only symptom may be the absence of any sensation in the frozen part;
- Paleness in the affected tissues;
- Firm or hard tissues; and
- Purple tissue, if a large area, such as an entire hand or food, is frostbitten.

1.1.7 If exposure occurs in temperatures that are below freezing (32ºF or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Symptoms due to frostbite may include, but is not limited to:

- Superficial redness of the skin;
- Slight numbness;
- Blisters;
- Obstruction of blood flow (ischemia);
- Blood clots (thrombosis); and
- Skin discoloration due to insufficient oxygen in the blood (cyanosis).

1.1.8 Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration.

1.1.9 Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

1.2 Hypothermia

1.2.1 Hypothermia is a lower than normal body temperature that occurs when outer cold cools the body faster than the body can produce heat to stay warm. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are the first affected.

- If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia.
- Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death.

1.2.2 Hypothermia can be caused by exposure to wind, cold, and/or moisture. The combination of wind, cold, and moisture can be deadly. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia is described in the table below.

Condition	Core Body Temp.	Signs/Symptoms	Treatment
Mild Hypothermia	99 – 97 F 37 – 36 C	Normal, shivering may begin	Seek dry shelter; replace wet clothing, insulate whole body and head, avoid sweating, use external warmth (bath, fire) only if core above 95 degrees F, give warm sweet drinks and food.
	97 – 95 F 36 – 35 C	Cold sensation, goose bumps, unable to perform complex tasks with hands, shiver can be mild to severe, hands numb.	
Moderate Hypothermia	95 – 93 F 35 – 34 C	Intense shivering, muscle in-coordination becomes apparent, movements slow and labored, stumbling pace, mild confusion may appear alert.	Avoid exercise and external warmth, gently rest; give warm sweet drinks and calories, internal warming via warm moist air, monitor pulse and breathing.
	93 – 90 F 34 – 32 C	Violent shivering persist, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, signs of depression, withdrawn.	
Severe Hypothermia	90 – 86 F 32 – 30 C	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behavior, but may be able to maintain posture and appearance of awareness.	Medical emergency, give nothing by mouth, wrap in an insulated blanket, avoid rapid rewarming, transfer to hospital immediately.
	86 – 82 F 30 – 28 C	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.	
	82 – 78 F 28 – 25.5 C	Unconscious, heart beat and respiration erratic, pulse may not be palpable.	
	78 – 75 F 25.5 – 24 C	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.	

1.2.3 Early warning signs of hypothermia:

- Feeling of being cold and tired;
- Heavier breathing and increased pulse rate;
- Tendency to keep moving (e.g., stamping feet, rubbing hands, continued walking/pacing);
- Goose bumps, holding arms tightly wrapped around the body, hunching of shoulders, and
- Shivering.

1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:

- Pain in the extremities;
- Severe shivering and numbness;
- Low core body temperature;
- Drowsiness and muscular weakness;
- Apathy;
- Mental confusion;
- Loss of consciousness;
- Shock, and
- Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

2.1 Frostbite

2.1.1 Wrap the victim in woollen blanket and keep dry until he or she can be brought inside.

2.1.2 Remove the victim from the cold environment.

2.1.3 Do not rub, chafe, or manipulate frozen parts.

2.1.4 Place the victim in warm water (102ºF to 105ºF) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.

2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.

2.1.6 Do not allow the victim to walk if his or her feet are affected.

2.1.7 Have the victim gently exercise the affected parts once they are thawed.

2.1.8 Seek immediate medical attention for thawing of serious frostbite.

2.2 Hypothermia

2.2.1 Bring the victim into a warm room or shelter as quickly as possible.

2.2.2 Give artificial respiration and stop any bleeding, if necessary.

2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.

2.2.4 Remove all wet clothing.

2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility

of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.

2.2.6 Do not allow the victim to sleep.

2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.

2.2.8 Keep the victim still. Do not try to walk.

2.2.9 Do not rub numb skin.

2.2.10 Get medical attention as soon as possible.

Americas

Compressed Gases

S3AM-114-PR1

1.0 Purpose and Scope

1.1 This procedure provides the requirements for using, handling, storing, transporting, disposition and/or decommissioning compressed gas cylinders.

1.2 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Compressed Air (Non-Breathable)** – Air that is at a pressure greater than that of the atmosphere. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment. Utilized for tools, equipment, and mechanical machinery and cleaning purposes as described in this procedure.

2.2 **Compressed Gas** – Any material or mixture in a pressure vessel having:

- An absolute pressure exceeding 40 pounds per square inch (PSI) at 70°F (25 pounds per square inch gauge); or
- An absolute pressure exceeding 104 Psia at 130°F, regardless of the pressure at 70°F.

2.3 **Cylinder –** Pressure vessel designed for pressures higher than 40 Psia and having a circular cross section.

2.4 **Decommission** – The removal of a compressed gas cylinder from service by rendering it permanently unusable.

2.5 **Disposition** – Recycling, treatment, or disposal of a compressed gas cylinder and/or its contents.

2.6 **Pneumatics –** The use of pressurized air to affect mechanical motion for machinery, equipment and tools.

2.7 **Psi** – Pounds per square inch.

2.8 **Psia –** Pounds per square inch absolute (i.e., pressure in a container that would appear on an ordinary gauge plus the local atmospheric pressure [14.696 psi at sea level]), psig- pounds per square inch gauge.

2.9 **Psig** – Pounds per square inch gauge. The pressure in a vessel or container as registered on a gauge attached to the container. This reading does not include the pressure of the atmosphere outside the container.

2.10 **Pressure Relief Valve** – A device installed on most cylinders to prevent the rupture of a normally pressurized cylinder when it is inadvertently exposed to fire or high temperatures.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-116-PR1 Hazardous Materials Shipping

3.3 S3AM-127-PR1 Exposure Monitoring

3.4 S3AM-208-PR1 Personal Protective Equipment

3.5 S3AM-209-PR1 Risk Assessment & Management

3.6 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Ensuring the safety of employees on their project sites.
- Implement these procedures during all activities involving compressed gases.
- Seek consultation with the SH&E Manager when unknown compressed gas cylinders are encountered.
- Confirm employees have received the appropriate training as it relates to compressed gases/compressed gas cylinders.
- Confirm a hazard assessment/evaluation of the activities involving compressed gases has been completed.
- Contact the SH&E Manager prior to any compressed gas cylinder operation.
- Immediately report any leaking/suspected leaking compressed gas cylinder(s) to the SH&E Manager and implement the appropriate emergency action(s).
- Immediately report the discovery of any unknown compressed gas cylinder(s) to the SH&E Manager and cordon off the area in all directions a minimum of 50 feet (15.24 meters).
- Confirm that all compressed gas cylinders are properly inspected, stored, and, secured.
- Confirm that all compressed gas cylinders are handled in a safe manner, protecting both the person and cylinder.
- Confirm that all compressed gas cylinder manifolds and connections are properly made and inspected.
- Confirm an appropriate emergency response plan is established prior to the start of any compressed gas cylinder operation.

4.1.2 **SH&E Manager**

- Review and authorize all compressed gas cylinder operations.
- Conduct/support compressed gas hazard assessments/evaluations.
- Provide awareness training to project teams regarding hazards of encountered compressed gases.
- Support the identification/disposition of unknown compressed gas cylinders.
- Support the development of a site-specific cylinder plan.

4.1.3 **Employee**

- Immediately report any leaking/suspected leaking compressed gas cylinder(s) to a Manager.
- Immediately report the discovery of any unknown compressed gas cylinders to Project Manager.
- Properly handle all compressed gas cylinders.
- Shall be supervised by employees experienced in the operation of compressed gas tools and equipment.

4.2 Training

4.2.1 On-site orientation to the hazards of the equipment and the proper use, handling, and storage shall be completed for all employees handling or coming into contact with compressed air tools and equipment or compressed gas cylinders. Refer to *S3AM-003-PR1 SH&E Training* and *S3AM-114-ATT1 Compressor Safety*.

4.2.2 Employees shall be instructed on the PPE requirements for the applicable tasks. Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.3 General Use of Compressed Air or Gas

4.3.1 Compressed air or other compressed gases are not to be used to blow dirt, chips, or dust from clothing while it is being worn. Compressed air used for other types of cleaning (other than clothing/persons) is to be limited to 30 psig.

4.3.2 The use of blown compressed air is to be controlled, and proper personal protective equipment or safeguards utilized, to protect against the possibility of eye injury to the operator or other persons.

4.3.3 Compressed air or gases are not to be used to empty containers of liquids.

4.3.4 Compressed gases are not to be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the operating gas pressure with a safety factor of at least four.

4.3.5 Compressed cylinders of unknown content will not be opened, but will be returned to the supplier, manufacturer or equivalent.

4.4 Air Compressor Operations

4.4.1 Air compressor equipment should be operated only by authorized and trained employees.

4.4.2 The air intake should be from a clean, outside, fresh air source. Screens or filters can be used to clean the air.

4.4.3 Air compressors should never be operated at speeds faster than the manufacturer's recommendation.

4.4.4 Equipment should not become overheated.

4.4.5 Moving parts, such as compressor flywheels, pulleys, and belts that could be hazardous should be effectively guarded.

4.4.6 Keep the air supplied tools clean and dry. Dust, moisture, and corrosive fumes can damage tools.

4.4.7 Keep tools clean, lubricated, and maintained according to manufacturer's instructions.

4.4.8 Only use attachments and accessories recommended by the manufacturer.

4.4.9 Review the manufacturer's instruction before using a tool.

4.4.10 Post warning signs where pneumatic tools are used.

4.4.11 Set up screens or shields in areas where nearby workers may be exposed to flying fragments, chips, dust, and excessive noise.

4.4.12 Be aware of proper handling and ergonomics while using the tool.

4.4.13 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.

4.4.14 Refer to *S3AM-114-ATT1 Compressor Safety* for additional information.

4.5 Air Hoses

4.5.1 Use the proper hose and fittings of the correct diameter.

4.5.2 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.

4.5.3 Choose air-supply hoses that have a minimum working pressure rating of 1035 kPa (150 psig) or 150% of the maximum pressure produced in the system, whichever is higher.

4.5.4 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.

4.5.5 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.

4.5.6 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).

4.5.7 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.

4.5.8 Do not operate the tool at a pressure above the manufacturer's rating.

4.5.9 Turn off the air pressure to hose when not in use or when changing power tools.

4.5.10 Do not carry a pneumatic tool by its hose.

4.5.11 Do not use compressed air to blow debris or to clean dirt from clothes.

4.5.12 All pipes, hoses, and fittings shall have a rating of the maximum pressure of the compressor. Compressed air pipelines should be identified (psi) as to maximum working pressure.

4.5.13 Air supply shutoff valves should be located (as near as possible) at the point-of-operation.

4.5.14 Air hoses should be kept free of grease and oil to reduce the possibility of deterioration.

4.5.15 Avoid trip hazards. Hoses should not be strung across floors or aisles where they are liable to cause employees to trip and fall. When possible, air supply hoses should be suspended overhead, or otherwise located to afford efficient access and protection against damage.

4.5.16 Hose ends shall be secured to prevent whipping if an accidental cut or break occurs.

4.5.17 Pneumatic impact tools, such as riveting guns, should never be pointed at a person.

4.5.18 Before a pneumatic tool is disconnected (unless it has quick disconnect plugs), the air supply shall be turned off at the control valve and the tool bled.

4.5.19 Shop air used for cleaning should be regulated to15 psi unless equipped with diffuser nozzles to provide lesser pressure.

4.5.20 Goggles, face shields or other eye protection shall be worn by employees using compressed air for cleaning equipment.

4.5.21 Static electricity can be generated through the use of pneumatic tools. This type of equipment shall be grounded or bonded if it is used where fuel, flammable vapors or explosive atmospheres are present.

4.5.22 The following are hazards associated with the use of compressed air tools and equipment:

- Poorly designed tool (wrist strain);
- Vibration (vibration-induced white finger);
- Noise (hearing loss); and
- Dust (respiratory problems).

4.5.23 The following hazards have the potential to cause serious bodily injury when working with compressed air:

- Incorrect tool selection;
- Use of damaged tool;
- Improper, inadequate, or no guards;
- Rotating shaft (entanglement);
- Wheel breakage (grinder);
- Flying chips;
- Whipping of the hose;
- Accidental start up;

- Air embolism (compressed air injected into the body);
- Dropped tool; and
- Tripping over hose.

4.6 Compressed Air Equipment Maintenance

4.6.1 Only authorized and trained employees should service and maintain air compressor equipment.

4.6.2 Exposed, non-current-carrying, metal parts of compressor should be effectively grounded.

4.6.3 Low Flash Point lubricants should not be used on compressors because of its high operating temperatures that could cause a fire or explosion.

4.6.4 Equipment should not be over lubricated.

4.6.5 Gasoline or diesel fuel powered compressors shall not be used indoors.

4.6.6 Equipment placed outside but near buildings should have the exhausts directed away from doors, windows and fresh air intakes.

4.6.7 Soapy water of lye solutions can be used to clean compressor parts of carbon deposits, but kerosene or other flammable substances should not be used. Frequent cleaning is necessary to keep compressors in good working condition.

4.6.8 The air systems should be completely purged after each cleaning.

4.6.9 During maintenance work, the switches of electrically operated compressors should be locked open and tagged to prevent accidental starting.

4.6.10 Portable electric compressors should be disconnected from the power supply before performing maintenance.

4.7 Compressed Gas Cylinder Requirements

4.7.1 Cylinders are not to be used unless they bear Department of Transportation (DOT) or Transportation of Dangerous Goods (TDG) markings showing that they have been tested as required by DOT or TDG regulations.

4.7.2 Cylinders shall never be dropped, struck, or permitted to strike each other violently. Cylinders may be moved by tilting and rolling them on their bottom edges.

4.7.3 Valve protection caps shall always be kept on cylinders when they are being moved or stored, and until ready for use. Caution should be exercised as insects such as spiders, wasps, and bees may be encountered in cylinder caps.

4.7.4 Do not lift cylinders by the valve protection cap.

4.7.5 Cylinder valves are to be kept closed except when gas is being used or when connected to a permanent manifold. Valves of empty cylinders shall be closed.

4.7.6 Cylinders shall never be used as rollers or supports, or for any purpose other than carrying gas.

4.7.7 Valves and regulators shall be inspected for foreign materials such as oil or dirt and deficiencies such as damaged threads or broken gauges. Deficient valves or regulators shall be removed from service and replaced.

4.7.8 Threads on regulator connections or other auxiliary equipment shall be the same as those on the cylinder valve outlet.

4.7.9 Regulators shall be specific to the gas being used and no adapters may be used to connect regulators to cylinders.

4.7.10 When withdrawing cylinder content, open the cylinder valve slowly using the appropriate tool (e.g., manufacturer supplied, non-sparking, etc.). Point the valve opening away from yourself and other persons.

4.7.11 Before a regulator is removed from a cylinder, close the cylinder valve and release all pressure from the regulator. This procedure also serves as a check to confirm that the main cylinder valve is completely closed.

4.7.12 Never hammer the valve wheel in attempting to open or close the valve.

4.7.13 No person, except the owner of the cylinder or person authorized by the owner, shall refill a cylinder (Exceptions to this includes the filling of self-contained breathing apparatus cylinders with Grade D breathing air, or the filling of the [Foxboro] Organic Vapor Analyzer (OVA) hydrogen cylinders). Disposable cylinders shall not be refilled with any material after use of the original contents.

4.7.14 Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high-temperature steam lines.

4.7.15 Cylinders are to be stored in an assigned, well-ventilated area, with full and empty cylinders stored separately. Empty cylinders shall be marked ‘empty’.

4.7.16 Stored fuel gases and oxygen cylinders are to be separated by at least 20 feet, or by a fire wall at least 5 feet high that has a fire-resistance rating of at least ½ hour.

4.7.17 Compressed gas cylinders shall only be stored or transported in an upright or vertical position. Horizontal storage or transportation of cylinders shall be conducted only as permitted by the applicable jurisdiction and in accordance with regulatory requirements (e.g., secured by chocks or ties to prevent rolling, foot plate, etc.).

4.7.18 Cylinders are to be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap is not to be removed or the cylinder valve opened until the cylinder is secured.

4.7.19 Repair of leaks shall never be attempted on a pressurized system. System pressure should be reduced to atmospheric pressure as rapidly as possible, and the Manager notified immediately.

4.7.20 Compressed gas cylinders shall be legibly marked for the purpose of identifying the gas content with either the chemical or the trade name of the gas. Such marking is to be done by means of stenciling, stamping or labelling, and shall not be readily removable. Whenever practical, the marking is to be located on the shoulder of the cylinder. Positive identification of the gas in any cylinder is required before connecting cylinders for use.

4.7.21 Gas cylinders moved by hoist shall be handled in suitable cradles or job-made “skip” (materials) boxes. Any slings used for this purpose shall be specifically designed for that cylinder handling.

4.7.22 Cylinders shall not be placed where they might form part of an electrical circuit.

4.7.23 Transfer of compressed gases (including acetylene) from one cylinder to another, or mixing of gases in a cylinder, is prohibited.

4.7.24 Oxygen cylinders are never to be stored near:

- Highly combustible materials, especially oil and grease;
- Reserve stocks of acetylene or other fuel gas cylinders; and
- Any other substance likely to cause or accelerate fire.

4.7.25 Compressed oxygen is never to be used:

- As breathing air;
- To purge pipelines, tanks, or any confined area;
- To supply a head-pressure tank;
- In pneumatic tools;

- In oil preheating burners;
- To start internal combustion engines;
- For ventilation;
- For cleaning clothing; and
- In any other way as a substitute for compressed air.

4.7.26 Use of a cylinder's contents for purposes other than those intended by the supplier is prohibited.

4.7.27 Cylinders of compressed natural gas or propane equipped with a pressure relief device shall always be positioned in a manner that this device remains above the liquid level (e.g., if stored or installed horizontally on a forklift, relief device is positioned at the top).

4.7.28 Storage of liquefied petroleum gas (LPG) within buildings is prohibited, and outdoor storage or LPG shall meet applicable building and fire codes.

4.8 Special Precautions for Compressed Gas Cylinders Containing Hydrogen

4.8.1 Inside buildings, cylinders of hydrogen should be separated from oxygen cylinders by a minimum distance of 20 feet (6.1 meters) or by a barrier of non-combustible material at least 5 feet (1.5 meters) high having a fire resistance rating of at least one half hour.

4.8.2 Conspicuous signs should be posted in hydrogen storage areas forbidding smoking, open flames or the use of lights or lighting not approved for use in flammable areas.

4.8.3 Hydrogen storage areas shall be labeled, "Hydrogen-Flammable Gas-No Smoking-No Open Flame" or equivalent.

4.9 Inspection of Compressed Gas Cylinders

4.9.1 Prior to formally accepting any delivered compressed gas cylinders, a visual inspection of each cylinder will be documented as specified below. In addition, all compressed gas cylinders stored at an AECOM facility will be inspected monthly.

- Visually inspect cylinders, refer to *S3AM-114-FM1 Compressed Gas Cylinder Inspection.*
- Verify that all the required markings are on the cylinders.
- If required, determine when the cylinder was last hydrostatically-tested.
- Inspect the safety relief devices, if required.
- If any defects are noted during the inspection, the cylinder should be refused on delivery and a new delivery requested (notify the Manager).

4.9.2 Where compressed gas cylinders are stored at an AECOM facility, a qualified person will be designated to confirm cylinder activities comply with the requirements in this procedure. Inspection entails the evaluation of the integrity of the cylinder as well as the serviceability of any attached manifold and valve fittings. Inspection activities of cylinders beyond visual inspection are recommended to be conducted in isolation or a remote location for worker and public safety. The inspection of any cylinder will be conducted by a qualified person, refer to *S3AM-114-FM1 Compressed Gas Cylinder Inspection*.

4.10 Cylinder Inspection Procedures

4.10.1 All cylinder inspection procedures will adhere to the applicable regulatory requirement. At a minimum, the inspection process will include the following procedures:

- Observe the cylinder from a safe distance to identify any visual markings or other information.
- Inspect the cylinder size, shape, and general condition (if visible, include the valve system/stem in the inspection process).

- If the cylinder or valve system appears to be in poor condition or has lost structural integrity, do not approach the cylinder. Observations indicating a cylinder is in poor condition may include:
  - Leaking,
  - Hissing sound,
  - Odor in vicinity of the cylinder,
  - Rusty components,
  - Bulging side wall or end, and/or
  - Corroded valve system.

4.10.2 If the cylinder is determined to be in poor condition, cordon the area off and limit access to necessary employees only.

4.10.3 Wear applicable PPE and approach the cylinder with the appropriate direct reading air monitoring instrument (do not approach from the ends of the cylinder), then determine the airborne contaminant concentrations in the immediate area.

4.10.4 Document cylinder information (e.g., visible markings, labels, placards, etc.).

4.10.5 Cylinders presenting potential deficiencies (e.g., dent, missing labels, valve protection cap cannot be removed by hand, corrosion, etc.) shall be tagged 'Do Not Use', removed from use, and returned to the supplier.

4.11 Ground Transport of Compressed Gas Cylinders

4.11.1 AECOM will transport (drive/haul) quantities of compressed gases which do not exceed Materials of Trade (MOT) quantities, whereas the transport of placardable quantities is prohibited without the proper DOT / TDG licenses/credentials and consultation with the SH&E Manager.

4.11.2 Compressed gas cylinders in portable service are to be conveyed by suitable trucks, to which they are securely fastened. All gas cylinders in service shall be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.

4.12 Air/Common Carrier Transport

4.12.1 All shipping of compressed gases via air/common carrier including instrument gases, regardless of quantity, shall be conducted by a qualified and trained HazMat Shipper (Level 1-2 Shipper) or jurisdictional equivalent, and shall conducted under the oversight of a designated DOT/International Air Transport Association (IATA) shipping specialist, or jurisdictional equivalent. Refer to *S3AM-116-PR1 Hazardous Materials Shipping.*

4.12.2 No compressed gas cylinder, regardless of contents or quantity, will be shipped via an external carrier vendor (i.e., UPS, FedEx, etc.) without the authorization of:

- SH&E Manager, and
- DOT/IATA shipping specialist.

4.13 Cylinder Color Coding Determination

4.13.1 The color coding of compressed gas cylinders is established by the Compressed Gas Association, which has assigned specific colors to categories or classes of chemicals/substances. It is important to note there is currently not requirement to adhere to this color coding scheme.

4.13.2 While recently manufactured cylinders reflect the color coding guidance established by the CGA, older cylinders may not reflect this nomenclature. It is also possible for cylinders to have been repainted a different color from their original.

4.13.3 Cylinder contents should never be determined by the color of the cylinder alone. Colors are not uniform throughout the compressed gas industry.

4.13.4 Cylinder contents shall be identified by a decal, label, tag, or stenciling. If an identifying label is lacking or not legible, return the container to the supplier, unused.

4.14 Air Monitoring Requirements

4.14.1 Air monitoring requirements are dependent upon the specific substances contained within the cylinders and will be specified within the site-specific safety plan prepared prior to commencement of field activities. Air monitoring parameters, refer to *S3AM-127-PR1 Exposure Monitoring*, may include, but are not limited to:

- Explosivity (i.e., lower explosive limit [LEL]), and
- Chemical-specific substance (e.g., chlorine, ammonia, arsine, etc.).

4.14.2 Action levels will be identified in the site-specific safety plan.

4.15 Cylinder Staging

4.15.1 Staging involves the organization, and sometimes consolidation, of cylinders that have similar contents or characteristics.

4.15.2 The staging of cylinders will occur in a remote location at the site in order to minimize the potential injury or property damage from an accidental release or emergency decompression (if the integrity of the cylinder is in question, it should not be moved).

4.15.3 Safe distances will be based on the evacuation distances provided in DOT's Emergency Response Guidebook (most current edition).

4.15.4 When multiple cylinders containing different substances are present, the distance should be based on the greatest evacuation distance required by the substances present.

4.16 Cylinder Disposition & Decommissioning Activities

4.16.1 Disposition refers to the recycling, treatment, or disposal of a compressed gas cylinder and/or its contents.

4.16.2 Recovery and recycling of materials are preferred over any other method of disposition. Cylinder disposition activities shall be approved by the SH&E Manager.

4.16.3 An effort should be made to recover and recycle the contents of a cylinder; however, if recovering or recycling the contents is not possible, then other options include:

- Venting to the Atmosphere,
- Flaring,
- Neutralization, and
- Detonation.

4.16.4 Under no circumstances will poisonous, toxic, or ozone-depleting substances be vented to the atmosphere. Only cylinders containing flammable gases should be detonated, as the flammable contents will be consumed in the subsequent explosion.

4.16.5 If the cylinder valve has been determined to be inoperable, then the available options for disposition are limited to having an outside vendor perform the remote opening and sampling of the cylinder, or detonation of the cylinder where the cylinder contents are consumed in the subsequent explosion (flammable gases only).

4.16.6 All cylinders shall be inventoried, staged, and inspected.

4.16.7 Prior to the commencement of cylinder disposition and decommissioning activities, local emergency response agencies (i.e., Fire Department, Medical, and Emergency Response, if separate) shall be confirmed and, as applicable, activities coordinated with the local agencies.

4.16.8 Air monitoring is mandatory during cylinder disposition and decommissioning operations.

4.16.9 An SH&E Manager shall be contacted during the planning stages of a cylinder disposition and decommissioning effort in order to determine whether a site-specific cylinder plan is required.

4.17 Venting to the Atmosphere

4.17.1 Cylinders that contain non-flammable, non-toxic materials can be vented to the atmosphere. All venting activities will be performed in accordance with the following procedures:

- Atmospheric venting will be accomplished at a remote location and in compliance with all applicable environmental air regulatory requirements.
- Atmospheric venting activities will be completed in a Level B Ensemble (unless otherwise specified in the site-specific safety plan and cylinder plan).
- Venting activities will be dependent upon a wind direction that does not carry the outgas plume in the direction of an adjacent public structure.
- The cylinder will be properly grounded to confirm a static charge is not generated, potentially resulting in ignition of a flammable gas.
- All tools used on the cylinder will be non-sparking.
- Low-pressure discharging will not exceed 15 pounds per square inch gauge (psig).
- Once discharging has started, all workers will retreat to the exclusion zone (minimum 100 feet) around the remote location until the discharging process is complete.

4.18 Flaring

4.18.1 Flaring activities involve the combustion of the cylinder contents through the discharge of a low-intensity flame. Flaring activities will be performed in accordance with the following procedures:

- Flaring will be accomplished at a remote location and in compliance with all applicable environmental air regulatory requirements.
- All personnel involved with flaring activities shall be appropriately trained and wear PPE appropriate to the hazards (e.g. Nomex fire-retardant forearm-length gloves, other fire-retardant clothing, self-contained breathing apparatus, etc.).
- Flaring activities will be dependent upon a wind direction that does not carry the combustion plume in the direction of any offsite structure or activity, or into uncontrolled (public access) areas.
- The cylinder will be properly grounded to confirm a static charge is not generated, potentially resulting in ignition of a flammable gas.
- All tools used on the cylinder will be non-sparking.
- Low-pressure discharging will not exceed 15 pounds per square inch gauge (psig).
- A hot work permit shall be completed prior to the start of flaring activities, refer to *S3AM-332-PR1 Hot Work*.
- No other cylinders will be within 50 feet (15.24 meters) of the cylinder being flared.
- Flaring activities will use a low-pressure discharge and maintain a small, low-intensity flame.
- A firewatch will be established, with a worker stationed outside the exclusion zone with a fire extinguisher (20A:100B:C) during flaring activities (i.e., fire watch). During the work the worker assigned to the firewatch will have no other duties.
- The flare will be positioned so that it is not pointing toward any flammable materials, persons, or equipment in the immediate area.

4.19 Neutralization

4.19.1 Neutralization refers to the on-site neutralization of the cylinder contents through a controlled chemical reaction process. Specialized equipment may be necessary based on the chemical involved, as well as reaction by-products, catalysts, or physical conditions (i.e., temperature, acidic, basic, etc.). Neutralization activities will be performed in accordance with the following procedures:

- Neutralization is the required disposition method for cylinders containing acid gases, as well as many alkaline gases.
- The neutralization process shall be approved by a professional engineer (e.g., chemical) or based on a published chemical-specific neutralization methodology.
- Liquid levels in the reaction vessels will be maintained at least 12 inches (30.5 centimeters) below the top of the vessel.
- Based on the specific chemical reaction, the temperature of the reaction vessel and its contents will be monitored continuously and controlled accordingly.
- Pressure levels will be maintained within acceptable limits to prevent the reaction from accelerating, unwanted by-product formation, or the break-through of the chemical intended to be neutralized.
- Employees involved in neutralization activities shall be appropriately trained and wear the PPE identified within the site-specific safety plan and cylinder plan.

4.20 Detonation

4.20.1 Detonation refers to the use of explosives to open and subsequently consume the contents of the cylinder by the heat generated during the explosion. Detonation activities will be performed in accordance with the following procedures:

- All personnel involved with detonation activities shall be appropriately trained and wear PPE appropriate to the hazards (e.g. Nomex fire-retardant forearm-length gloves, other fire-retardant clothing, self-contained breathing apparatus, etc.).
- A detonation plan shall be submitted to and approved by the SH&E Manager prior to the commencement of cylinder detonation activities.
- The detonation of compressed gas cylinders will be completed under the guidance of experienced ordnance and explosives (OE) professional who is licensed in the use of explosives.
- A sufficient amount of explosives will be used to consume the entire contents of the cylinder (flammable gases only).
- A blast pit will be excavated where all detonations will take place.
- The OE professional will determine the blast hazard zone/potential debris impact zone, and this area will be evacuated prior to the detonation.
- The OE professional will sound a warning signal (e.g., horn or equivalent) three times to indicate that a detonation is imminent and confirm all persons have evacuated the blast hazard zone prior to detonation.
- Employees will be on standby outside the blast hazard zone with fire extinguishers (minimum rating of 20A:100B:C).

4.21 Cylinder Decommissioning Operations

4.21.1 Decommissioning refers to the removal of a compressed gas cylinder from service by rendering it permanently unusable.

4.21.2 Prior to decommissioning, cylinder contents will be verified, removed from the cylinder, and the cylinder purged with an inert gas (e.g., nitrogen, carbon dioxide, etc.).

4.21.3 All identifying marks or decals will be removed from the cylinder.

4.21.4 The SH&E Manager shall be contacted prior to the decommissioning of compressed gas cylinders that contain or previously contained:

- Ethylene oxide,
- Arsine,
- Diborane,
- Hydrogen selenide,
- Cyanogen chloride,
- Amines,
- Hydrogen sulfide,
- Acetylene, or
- Methyl mercaptan.

4.21.5 Additional safety precautions may be necessary due to highly reactive residues left behind by these substances.

4.21.6 The recommended methods of decommissioning include:

- Burning/torch-cutting an elongated hole into the side of the cylinder, refer to *S3AM-332-PR1 Hot Work;*
- Torch-cutting the cylinder in half; and
- Crushing the cylinder.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-114-ATT1 Compressor Safety

6.2 S3AM-114-FM1 Compressed Gas Cylinder Inspection

Americas

Compressor Safety

S3AM-114-ATT1

1.0 Objective / Overview

1.1 Compressors should be used with extreme caution in order to prevent personal injury.

1.2 When using a compressor it's important to follow the manufacturer's instructions to avoid injuring someone or damaging your compressor.

1.3 Allow only trained, authorized personnel to operate the compressor. Along with training, other safety measures include: proper maintenance of equipment and personal protective equipment.

2.0 Safe Operating Guidelines

2.1 Follow manufactures recommended operating instructions, every compressor is not the same. Maintain adequate ventilation.

2.2 Gas and diesel powered generators emit carbon monoxide (CO). Never operate a fuel-powered compressor in an enclosed building without proper ventilation.

2.3 Turn the compressor off to refuel. Gasoline and its vapors may ignite if they come into contact with hot components or an electrical spark, store fuel in a properly designed container in a secure location.

2.4 Operators shall perform a pre-operational check of all air hoses, couplings, and connections to determine if leakage or other damage exists. Tag unsafe equipment and take out of service immediately.

2.5 Decompress air from the compressor prior to removing any caps or air equipment attachments such as jackhammers, drills, etc.

2.6 Keep oil and flammable material clear of air fittings and joints.

2.7 Make sure connections are secure to avoid a hose coming loose during use.

2.8 To avoid a shock, make sure that your hands are dry and you're standing in a dry place whenever you operate an electrically powered compressor.

2.9 Use only UL-listed, three-prong extension cords. Be sure the extension cord is the proper size (wire-gauge) to handle the electric load that will be plugged into it.

2.10 Have a Class A:B:C fire extinguisher readily available at all times.

3.0 Potential Hazards

3.1 Burns from contact with the hot muffler or engine

3.2 Shocks/electrocution

3.3 Noise exposure

3.4 Inhaling exhaust gases, CO

3.5 Contact with pressurized air

4.0 Training Requirements

4.1 Review of applicable procedures.

4.2 Demonstrated knowledge on the use of the compressor.

4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment

5.1 Leather Gloves

5.2 Hearing Protection

5.3 Long Sleeve Shirt (e.g., to shield from burns, etc.)

5.4 Refer to *S3AM-208-PR1 Personal Protective Equipment*

Americas

Compressed Gas Cylinder Inspection

S3AM-114-FM1

Location Inspected: _____ **Job No.:** _____

Date Inspected: _____ **Name of Inspector:** _____

1.	DOT / TDG container specification number present on cylinders.	☐ Yes	☐ No	☐ NA
2.	Proper DOT / TDG shipping name, ID # and hazard class on cylinders.	☐ Yes	☐ No	☐ NA
3.	Manufacturer's name and appropriate hazard warnings present.	☐ Yes	☐ No	☐ NA
4.	Serial number of cylinders and inspectors official mark present.	☐ Yes	☐ No	☐ NA
5.	Most recent hydrostatic test date marked and within 5 years.	☐ Yes	☐ No	☐ NA
6.	Cylinder valve and neck ring free of oil, grease or other foreign matter.	☐ Yes	☐ No	☐ NA
7.	Valve threads clean and in good condition.	☐ Yes	☐ No	☐ NA
8.	Pressure rating of cylinder not exceeded.	☐ Yes	☐ No	☐ NA
9.	Cylinder surface is free of cracks, and dents, gouges, weld defects, etc.	☐ Yes	☐ No	☐ NA
10.	Cylinder surface is free of arc burns and fire burns.	☐ Yes	☐ No	☐ NA
11.	Cylinder cap is present and threaded in place.	☐ Yes	☐ No	☐ NA
12.	Cylinder surface, particularly bottom, is free of excessive corrosion, and pitting.	☐ Yes	☐ No	☐ NA
13.	Cylinders must be capped when regulators are removed.	☐ Yes	☐ No	☐ NA
14.	Oxygen and fuel cylinders are stowed in designated well-ventilated areas.	☐ Yes	☐ No	☐ NA
15.	Storage areas have temperatures less than 125º F (52º C).	☐ Yes	☐ No	☐ NA
16.	Cylinders are stored upright and secured from falling over.	☐ Yes	☐ No	☐ NA
17.	Cylinders are in segregated groups by gas type and not intermingled with other cylinders.	☐ Yes	☐ No	☐ NA
18.	Oxygen cylinders are stored at least 20 feet (6.1 meters) away from flammables. (A fire-resistive partition of at least 1-hour fire-resistance rating of at least 5-foot (1.52 meters) height may be used in lieu of 20 foot [6.1 meter] separation.)	☐ Yes	☐ No	☐ NA
19.	Flammable or combustible materials are kept at least 20 feet (6.1 meters) away from stored cylinders.	☐ Yes	☐ No	☐ NA
20.	Gas cylinder valves are protected from snow and ice during winter months.	☐ Yes	☐ No	☐ NA
21.	Oxygen cylinders are kept free from oil and grease.	☐ Yes	☐ No	☐ NA
22.	Welding cylinders are securely fastened to ready-use racks.	☐ Yes	☐ No	☐ NA
23.	Smoking or open flames are not permitted in areas where cylinders are stored.	☐ Yes	☐ No	☐ NA
24.	Cylinder storage areas are posted with the following sign: "DANGER – NO SMOKING OR OPEN FLAME".	☐ Yes	☐ No	☐ NA
25.	Cylinders are labeled with gas contents and warning statement.	☐ Yes	☐ No	☐ NA
26.	Empty cylinders are segregated from full cylinders.	☐ Yes	☐ No	☐ NA

Americas

Concrete

S3AM-338-PR1

1.0 Purpose and Scope

1.1 The purpose of this procedure is to confirm the safety of AECOM Americas personnel during the installation of concrete forms, pouring of new concrete structures, or installation of preformed concrete structures.

1.2 This procedure applies to AECOM Americas employees and any other entity and its personnel contractually required to comply with this document's content where concrete is poured or handled. This procedure also applies to Portland cement, mortar, stucco, and other applications of cementitious products.

2.0 Definitions

2.1 None

3.0 References

3.1 S3AM-208-PR Personal Protect Equipment

3.2 S3AM 304 PR1 Fall Protection

4.0 Procedure

4.1 Implementation of this procedure is the responsibility of the manager directing activities of the facility, site, or project location.

4.2 General

4.2.1 Employees working above any adjacent working surfaces shall review and conform to the applicable fall protection requirements listed in *S3AM 304 PR1 Fall Protection*.

4.2.2 No employees will be permitted to work above an impalement hazard (e.g., rebar) unless it has been protected to eliminate the hazard of impalement.

4.2.3 Prohibit riding of concrete buckets for any purpose. Keep vibrator crews out from under concrete buckets suspended from cranes or cableways.

4.2.4 Provide an employee with a whistle or other sound-producing device to watch for approaching buckets and warn employees to stand clear while the concrete is dumped.

4.2.5 Where practical, use tag lines to control and position suspended concrete buckets.

4.2.6 Provide PumpCrete™ or similar systems using discharge pipes with pipe supports designed for 100 percent overload. Provide compressed-air hoses in such systems with positive fail-safe joint connectors, or otherwise secure them to prevent separation of sections when pressurized.

4.2.7 All nozzle men applying cement, air, sand and water through a pneumatic or high-pressure hose shall wear protective head, hand, and face equipment.

4.2.8 All concrete workers shall wear protective clothing, including safety glasses; rubber boots, and gloves, to reduce the danger of concrete burns. Refer to *S3AM-208-PR Personal Protection Equipment* for additional information.

4.2.9 Wear appropriate personal protective equipment when using tools and equipment associated with concrete masonry work.

4.2.10 Finishers shall wear safety glasses and face shields when chipping, wire brushing, or using power-impact or rotary tools in patching concrete.

4.2.11 In the pour area, or any area where dry Portland cement is being handled or mixed with water or

aggregate, provide means to flush eyes (e.g., eyewash station, bottles) for 15 minutes. If the material contacts skin, wash skin with water and ph-neutral soap or mild detergent.

4.2.12 Provide temporary winter protection enclosures with adequate ventilation, lighting, and fire protection.

4.2.13 Equip pavers with a loud warning bell or horn that sounds when a paver moves ahead or the bucket is run out.

4.2.14 Provide conical or tapered bottoms with mechanical or pneumatic means of starting the flow of materials for bulk storage bins, containers, or silos.

4.2.15 Construct handles on bull floats used where they may contact energized electrical conductors of nonconductive material, or insulate with a nonconductive sheath whose electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.

4.2.16 Do not extend handles of buggies beyond the wheels on either side of the buggy. Installation of knuckle guards on buggy handles is recommended.

4.2.17 Provide concrete buckets equipped with hydraulic or pneumatically operated gates with positive safety latches or similar safety devices installed to prevent premature or accidental dumping. The buckets will be designed to prevent excess aggregate and loose material from accumulating excessively on the top and sides of the bucket.

4.2.18 Block the wheels of ready-mix trucks and set the brakes to prevent movement when discharging on a slope.

4.2.19 Properly guard exposed gears, chains, and rollers of mixers.

4.2.20 Secure sections and ends of tremies, elephant trunks, and similar concrete conveyances with wire rope, chain, or similar safe fastener.

4.2.21 Equip powered and rotating-type concrete troweling machines that are manually guided with a control or dead-man switch that will automatically shut off the power whenever the operator removes his hands from the equipment handles.

4.2.22 The use of ready-mix concrete trucks may create traffic problems, which proper planning and care can lessen and/or eliminate. Control backing operations through the use of a properly trained and attired flag person/spotter who will be positioned so that they have a clear view of the area behind the truck, as well as be clearly visible to the truck driver. Route movement of personnel and project equipment away from this area so that they do not have to cross the truck's means of egress.

4.3 Forms and Shoring

4.3.1 The completed shoring setup should be a homogenous unit or units. For example, do not use tubular steel shoring in combination with adjustable wood or jack-type shoring.

4.3.2 Confirm that formwork and shoring are be designed, erected, supported, braced, and maintained so that they will safely support all vertical and lateral loads that may be imposed upon them during placement of concrete.

4.3.3 Confirm that drawings or plans showing the jack layout, formwork, shoring, working decks, and scaffolding are available at the jobsite.

4.3.4 Remove and stockpile stripped forms and shoring promptly after stripping in all areas in which persons are required to work or pass. Remove and dispose of adhered concrete from forms and planking before stacking when possible to prevent generation of concrete dust. Pull, cut, or remove by other means any protruding nails, wire ties, and other form accessories not necessary to subsequent work to eliminate the hazard.

4.3.5 Do not impose any construction loads on the partially completed structure unless such loading has been considered in the design and approved by the engineer-architect.

4.3.6 When temporary storage of reinforcing rods, material, or equipment on top of formwork becomes

necessary, strengthen these areas to meet the intended loads.

4.3.7 Provide sills for shoring that are sound, rigid, and capable of carrying the maximum intended load.

4.3.8 Inspect all shoring equipment prior to erection to determine that it is as specified in the shoring layout. Do not use any equipment for shoring that is found to be damaged.

4.3.9 Inspect erected shoring equipment immediately prior to, during, and immediately after the placement of concrete. Immediately reinforce or re-shore any shoring equipment that is found to be damaged or weakened.

4.3.10 Provide re-shoring when necessary to safely support slabs and beams after stripping, or where such members are subjected to superimposed loads due to construction work done.

4.3.11 Build shoring or form systems in accordance with the AECOM procedure governing excavation when working in excavations.

4.4 Tube and Coupler Shoring

4.4.1 Use tubular steel frames for shoring layouts in accordance with each manufacturer's recommended safe working load based on tests conducted according to the "Recommended Procedure for Compression Testing Scaffolds and Shores" by the Scaffolding and Shoring Institute.

4.4.2 Prior to erection of steel frame shoring, conduct a thorough inspection to confirm material is not heavily rusted, bent, dented, or otherwise damaged or defective.

4.4.3 Provide final adjustment of adjustment screws prior to placement of concrete. Keep screw extensions to a minimum for maximum load carrying capacity.

4.4.4 Plan, design and construct any form, regardless of size, with an adequate factor of safety.

4.4.5 Do not use couplers (clamps) if they are deformed, broken, have defective or missing threads on bolts, or other defects.

4.4.6 Use material for the coupler (clamps) that is of a structural type such as drop forged steel, malleable iron, or structural grade aluminum. Do not use gray cast iron.

4.4.7 When checking the erected shoring towers with the shoring layout, confirm that the spacing between posts does not exceed that shown on the layout; check all interlocking of tubular members and tightness of couplings.

4.4.8 Confirm that all base plates, shore heads, extension devices, or adjustment screws are in firm contact with the footing sill and the form material, and are snug against the posts.

4.5 Vertical Slip Forms

4.5.1 Confirm that the steel rods or pipe on which the jacks climb or by which the forms are lifted are designed specifically for that purpose. Brace any rods not encased in concrete.

4.5.2 Position jacks and vertical supports in such a manner that the vertical loads are distributed equally and do not exceed the capacity of the jacks.

4.5.3 Provide the jacks or other lifting devices with mechanical dogs or other automatic holding devices to provide protection in case of failure of the power supply or the lifting mechanism.

4.5.4 Lift steadily and uniformly, and do not exceed the predetermined safe rate of lift.

4.5.5 Provide lateral and diagonal bracing of the forms to prevent excessive distortion of the structure during the jacking operation.

4.5.6 During jacking operations, the form structure shall be maintained in line and plumb.

4.5.7 Provide all vertical lift forms with scaffolding or work platforms completely encircling the area of placement.

4.6 Pre-Stressed and Post-Stressed Concrete

4.6.1 Keep tools and strand devices clean and in good repair to prevent failure.

4.6.2 Do not permit employees to stand in line or directly over the jacking equipment during tensioning operations. Provide signs and barriers to prevent employees from working behind the jack. Shield all jacking equipment and attachment pieces to protect the workers performing the stressing operations.

4.6.3 Carefully stack stressed members on a level base.

4.6.4 Pre-stressed girders and beams are often unstable when tipped; brace during transportation and handle in such a way to keep the member upright.

4.6.5 Handle stressed members at pick points specifically designated on the manufacturer's drawings, and with the lifting devices recommended by the manufacturer or the engineer in charge.

4.6.6 Do not allow personnel under stressed members during lifting and erection.

4.6.7 Keep anchor(s) turned up close to the anchor plate during jacking operations of any tensioning element(s).

4.6.8 Frequently inspect pulling heads, bolts, and hydraulic rams for indication of fatigue, and the threads on bolts and nuts for diminishing cross section.

4.7 Pre-Cast Concrete and Tilt-Up Operations

4.7.1 Do not permit employees under pre-cast walls, panels, or sections while they are being lifted or tilted into position.

4.7.2 Use properly attached tag lines, especially if the load is to be lifted and moved into place.

4.7.3 Adequately brace pre-cast walls or vertical concrete panels during construction.

4.7.4 Securely attach braces or shores to the concrete member.

4.7.5 Confirm lifting inserts on or in tilt-up pre-cast concrete members are capable of supporting at least two (2) times the maximum intended load applied or transmitted to them.

4.7.6 Confirm lifting hardware can support at least five (5) times the maximum intended load applied or transmitted to the lifting hardware.

4.8 Masonry Work

4.8.1 Handle and store masonry building materials in accordance with AECOM procedures for material handling; scaffolds for masonry construction shall be built in accordance with the AECOM procedures for scaffolding.

4.8.2 Equip power saws for cutting brick or stone with dust collectors or wet cutting methods to control dust. The exhausted dust will be directed away from vehicle or personnel traffic. If brick, stone, or mortar contains more than 1 percent crystalline silica, respirators may be required until air sampling determines that the task does not constitute a potential respiratory hazard.

4.8.3 Employees cutting brick or stone shall wear approved safety goggles or face shields over safety glasses, and hearing protection as appropriate for the task noise levels.

4.8.4 Keep mortar tubs free from ragged edges that may cut the hands, legs, and arms of bricklayers.

4.8.5 Properly brace all walls or vertical surfaces during construction to withstand wind and other pressure.

4.8.6 Dried mortar will not be dropped from planks, crushed by vehicles, or otherwise handled in such a manner as to create a dust hazard.

4.8.7 Masons and other workers with dusty clothes shall remove their outer clothing or otherwise remove masonry-generated dust from their clothes prior to leaving the work area for breaks or end of work. Do not use high-pressure air to remove dust.

5.0 Records

5.1 The following documentation will be maintained.

5.1.1 Training of flagmen/spotters

5.1.2 Inspections of shoring equipment

5.1.3 Air sampling logs for crystalline silica, as needed

6.0 Attachments

6.1 S3AM-338-ATT1 Concrete Products Health Effects

Americas

Concrete Products Health Effects

S3AM-338-ATT1

Powdered cement products are responsible for a wide variety of occupational health hazards, including inhalation, dermal, and eye hazards.

Dermal and Eye Hazards: Exposure to powdered cement products may cause drying of the skin and mild irritation, or more significant effects from the aggravation of other conditions. Wet cement is typically caustic (pH > 12) and dermal exposure may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns. Eye exposures may cause immediate or delayed irritation or inflammation of the cornea. Eye contact with larger amounts of dry powder or splashes of wet cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.

Some individuals who are exposed to cement may exhibit an allergic response, which can result in symptoms ranging from mild rashes to severe skin ulcers. Cement dermatitis may be irritant contact dermatitis induced by the alkaline, abrasive, and hygroscopic (water-absorbing) properties of cement.

Where these compounds are used, eyewash stations and drenching equipment should be staged in close proximity. OSHA requires that suitable facilities for quick drenching or flushing be provided within the work area for immediate use if an employee's eyes or body may be exposed to corrosive materials.

PPE: Refer to *S3AM-208-PR1 Personal Protective Equipment*. Appropriate PPE should include boots and gloves, and may also include eye protection, such as safety glasses with side shields or goggles, in some circumstances. Such equipment must be maintained in a sanitary and reliable condition when not in use, and employees must be able to clean or exchange their equipment if it becomes ineffective or contaminated on the inside with cement. In addition to long-sleeved shirts and long pants, protective clothing such as coveralls may also be appropriate to prevent the skin from coming in contact with cement.

Sanitation: In construction operations where employees may be exposed to harmful contaminants adequate washing facilities in near proximity to the worksite shall be supplied. Refer to *S3AM-013-PR1 Housekeeping*.

Inhalation Hazards/Established Exposure Limits: Inhalation of dry cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system, or may cause or aggravate certain lung diseases or conditions. Although powdered cement products are not recognized as carcinogenic by NTP, OSHA, or IARC, they may contain small amounts of substances, such as crystalline silica and Cr(VI), which are recognized as carcinogens by these organizations. Refer to *S3AM-110-PR1 Toxic & Hazardous Substances*.

Managers shall confirm that concentrations of cement dust are at or below the established exposure limit for the applicable jurisdiction. If maintaining dust levels below the established exposure limit is not feasible, exposed employees must wear respiratory protection in accordance with *S3AM-123-PR1 Respiratory Protection*. This would be most likely in construction operations such as terrazzo work, mixing mortar and jobsite mixing of concrete.

Training/Hazard Communication: Powdered cement is considered a hazardous chemical under OSHA's Hazard Communication standard; it should be included in the employer's Hazard Communication program. Employers whose employees are exposed to cement must provide appropriate training, maintain labels and copies of SDS for cement products in their workplaces, and ensure that these documents are readily accessible during each work shift.

The Hazard Communication standard also requires chemical manufacturers and importers to assess the hazards of chemicals that they produce or import and disseminate information regarding those hazards. Among other information, each MSDS must identify the hazardous chemicals it pertains to, and the health hazards presented by those chemicals, "including signs and symptoms of exposure," as well as generally applicable precautions for safe handling and use and control measures.

Because powdered cement is a mixture, the Hazard Communication standard provides two ways in which the SDS can list the hazardous chemicals it contains. If the mixture is tested as a whole to determine its hazards, the standard allows the SDS to list only "the ingredients which contribute to these known hazards." For a mixture that has not been tested as a whole, the SDS must include the ingredient(s) present in a concentration below 1% (0.1% for a

carcinogens) - as is likely for the Cr(VI) in portland cement - "if there is evidence that the ingredients(s) could be released from the mixture in concentrations which could present a health risk to employees".

Americas

Corrosive & Reactive Materials

S3AM-125-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content where corrosive and/or reactive materials are used or stored.

1.2 The purpose of this procedure is to protect employees from the hazards of corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-115-PR1 Hazardous Materials Communication

3.2 S3AM-116-PR1 Hazardous Materials Shipping

3.3 S3AM-123-PR1 Respiratory Protection

3.4 S3AM-208-PR1 Personal Protective Equipment

4.0 Procedure

4.1 Implementation of this procedure is the responsibility of the Manager directing activities of the facility, site, or project location.

4.2 Appoint a responsible person who will:

4.2.1 Inspect storage areas periodically.

4.2.2 Monitor the quantity of corrosive and reactive materials on site, as well as that of incoming materials.

4.2.3 Review work practices that involve corrosive and reactive materials.

4.3 Require that all employees working with corrosive or reactive materials, or who may be exposed to such materials, are trained in accordance with *S3AM-115-PR1 – Hazardous Materials Communication*.

4.4 Control the use of corrosive and reactive materials by AECOM personnel.

4.4.1 Order only those materials and quantities that are needed to complete a job.

4.4.2 Check incoming corrosive and reactive materials for proper labeling in accordance with *S3AM-115-PR1 Hazardous Materials Communication*.

- Label materials, if needed, as they arrive on site.
- Mark reactive materials containers with the date of receipt of the chemical.

4.4.3 Check incoming corrosive and reactive materials for safety data sheets (SDS). If SDSs are not provided or are already on file, order them from the manufacturer, distributor, or vendor.

4.4.4 Add incoming corrosive and reactive chemicals to the hazardous materials inventory, if not already present, following procedures set forth in *S3AM-115-PR1 Hazardous Materials Communication.*

4.4.5 Do not store any quantity of corrosive or reactive materials in an office (with the exception of limited quantities of consumer products). These materials are to be stored off site, or at an on-site laboratory or storage area.

4.5 Store corrosive and reactive materials as indicted in the MSDS:

4.5.1 In a cool, dry environment, free from extremes of temperature and humidity.

4.5.2 In a manner that separates them from other materials (including flammables and oxidizers) and from each other.

- Separate acids and bases.
- Separate reactive materials from acids and bases, and protect from contact with water.

4.5.3 On materials that are acid-resistant (Teflon-coated, plastic, etc.) for small containers.

4.5.4 Covered, not stacked on one another, on acid-resistant material for carboys (approximately 5 gallons/22 liters).

4.5.5 On individual racks or securely blocked on skids, with closure (plug) facing upward to prevent leakage from drums.

4.6 Require that labeling and signage are in place.

4.6.1 Label containers with the appropriate warning word to indicate the hazard, such as: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.

4.7 Use corrosive and reactive materials appropriately.

4.7.1 Prior to use and in accordance with MSDS, safe-handling procedures shall be developed for each operation, and type and concentration of the chemical. In all cases, review the MSDS and product information before use.

4.7.2 Follow *S3AM-208-PR1 Personal Protective Equipment* when working with or around corrosive and reactive materials. Review the MSDS for the chemical used to determine the specific type of PPE needed, to include at a minimum:

- Chemical-splash goggles
- Chemical-resistant gloves
- Chemical-resistant apron

4.7.3 Obtain medical care immediately in the event of:

- Skin or eye exposure (e.g., splash) to corrosive liquids
- Inhalation of vapors of corrosive liquids that cause respiratory discomfort.

4.7.4 Require an eyewash station to be located in all areas where acids or bases are used. Safety showers shall be nearby if significant acid or base quantities are involved.

- Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach, and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.
- Keep the areas surrounding eyewashes and safety showers free of stored materials or debris at all times.
- Mark emergency eyewashes and showers with a highly visible sign.
- Require the area around emergency eyewashes and showers to be well lighted and visible.
- Where portable eyewash units are used, a process shall be in place to change the water and clean the unit, as required by the manufacturer's instructions.
- Require emergency showers and shower/eyewash combinations connected to a self-contained water supply to deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.

- Require emergency showers and shower/eyewash combinations permanently connected to a potable water supply to deliver at least 30 gallons (127.5 liters) per minute continuously.
- Require emergency eyewashes to be capable of delivering to the eyes not less than 0.4 gallon (1.5 liters) per minute for 15 minutes.

4.8 Be prepared to clean up spills of corrosive and reactive materials.

4.8.1 Have a written spill response plan in place before materials are stored on site.

4.8.2 Have commercial spill kits available for cleanup of small quantities of materials. At a minimum, kits should contain appropriate protective clothing (including full-body suits, gloves, and boots) and spill control equipment (including absorbents, pillows, shovels, containers, etc.).

4.8.3 Where necessary, confirm that appropriate respiratory protection equipment is provided to spill responders. For additional information, see *S3AM-123-PR1 Respiratory Protection*.

4.8.4 Clean up or respond to spills promptly.

4.8.5 Confirm that personnel responding to a spill have been trained in the hazards associated with the spilled material, as well as use of the spill control equipment, including PPE required for the task.

4.8.6 Do not use combustible organic materials such as sawdust, excelsior, wood chips and shavings, paper, rags, or burlap bags to absorb or clean up spills.

4.9 Develop a waste management plan and procedures, including procedures for collection, storage, labeling, pick-up and transport, and final disposal.

4.10 Dispose of corrosive and reactive materials appropriately.

4.10.1 Segregate organic acids, inorganic acids, and basic wastes.

4.10.2 Contract hazardous waste disposal services should be obtained, as necessary, to dispose of waste materials. All waste shall be appropriately packaged for off-site transportation, if applicable.

4.10.3 Wastes shall be marked, labeled, and shipped in accordance with regulatory requirements. For additional information, see *S3AM-116-PR1 Hazardous Materials Shipping*.

4.11 Inspect corrosive and reactive storage and use areas periodically.

4.11.1 Inspect office, laboratory, and project settings quarterly.

4.11.2 Use the inspection sheet provided as *S3AM-125-FM1 Corrosive & Reactive Materials Inspection* or equivalent, to inspect sites.

5.0 Records

The following information will be maintained in the location or project file:

5.1 Completed Corrosive and Reactive Material Inspection Sheets.

5.2 Worker Right-to-Know training documentation.

5.3 Written Spill Response Plan.

5.4 Waste Management Plan.

5.5 Documentation of training for spill response personnel.

5.6 Documentation of hazard communication training for personnel exposed to corrosive and/or reactive materials.

6.0 Attachments

6.1 S3AM-125-FM1 Corrosive & Reactive Materials Inspection

Americas

Corrosive & Reactive Materials Inspection

S3NA-125-FM1

Location: _____

Name of Inspector: _____ **Date Inspected:** _____

Labeling				
1.	Original containers are labeled with: • Name of chemical • Signal word (e.g., DANGER; WARNING; CAUTION, etc.) • Manufacturer	☐ Yes	☐ No	☐ NA
Pre-Job Activities				
2.	Corrosives and reactives are stored in a cool, dry environment, free from temperature extremes	☐ Yes	☐ No	☐ NA
3.	Corrosives and reactives are stored in their properly labeled original containers, cushioned against shock, and stored to prevent leaks	☐ Yes	☐ No	☐ NA
4.	Corrosives are not stored in the vicinity of oxidizers	☐ Yes	☐ No	☐ NA
5.	Hydrofluoric acid is stored only in acid-proof polyethylene- or ceresin-lined containers	☐ Yes	☐ No	☐ NA
6.	Corrosives are stored on acid-resistant material	☐ Yes	☐ No	☐ NA
7.	Chromic acid, nitric acid, perchloric acid, and potassium permanganate (all oxidizers) are stored separately from other corrosives and flammables	☐ Yes	☐ No	☐ NA
Handling				
8.	The following minimum required PPE is used when working with corrosives: • Chemical splash goggles • Chemical resistant gloves • Chemical resistant apron	☐ Yes	☐ No	☐ NA
9.	Bottles or carboys are opened slowly to guard from splashes.	☐ Yes	☐ No	☐ NA
10.	The outside of the container is washed off with water after use to clean off any droplets of material.	☐ Yes	☐ No	☐ NA
11.	An eyewash is located in all areas where corrosives are used.	☐ Yes	☐ No	☐ NA
12.	An eyewash is:			
	• Within 25 feet (7.62 meters) or 10 seconds of travel	☐ Yes	☐ No	☐ NA
	• Marked with a highly visible sign	☐ Yes	☐ No	☐ NA
	• Well lit and visible	☐ Yes	☐ No	☐ NA
	• Working and delivering a minimum of 1.5 liters of water per minute for 15 minutes	☐ Yes	☐ No	☐ NA
13.	Where substantial quantities of corrosives and/or reactives are stored, access to an emergency shower is available.	☐ Yes	☐ No	☐ NA
14.	Spill control materials compatible with chemicals are available for emergency use.	☐ Yes	☐ No	☐ NA
Waste Disposal				
15.	Organic acid, inorganic acid, and basic waste are kept segregated.	☐ Yes	☐ No	☐ NA
16.	Corrosive waste is disposed in accordance with regulatory and client requirements.	☐ Yes	☐ No	☐ NA
17.	A waste management plan or procedure is in place.	☐ Yes	☐ No	☐ NA
18.	Arrangements for waste collection, transport, and disposal are in place.	☐ Yes	☐ No	☐ NA

Comments:

Americas

Drilling, Boring & Direct Push Probing

S3AM-321-PR1

1.0 Purpose and Scope

1.1 This document provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with drilling, boring and direct-push probing. These hazards include, but are not limited to, encountering underground utilities, subsurface installations, rotating equipment and potential overhead hazards.

1.2 This procedure provides the minimum requirements to be followed when drilling, boring, and probing work are performed.

1.3 This procedure applies to all Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling, and communications, etc.

2.2 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.3 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits / trenches or other man-made cuts, cavity, trench, or depression in an earth surface formed by earth removal.

2.4 **Subsurface Installations –** Examples: Subterranean tunnels, underground parking garages, and other structures beneath the surface.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protection Equipment

3.4 S3AM-209-PR1 Risk Assessment & Management

3.5 S3AM-213-PR1 Subcontractor Management

3.6 S3AM-305-PR1 Hand & Power Tools

3.7 S3AM-306-PR1 Highway and Road Work

3.8 S3AM-322-PR1 Overhead Lines

3.9 S3AM-322-FM1 Overhead Electrical Lines Acknowledgement

3.10 S3AM-325-PR1 Lockout Tagout

3.11 S3AM-326-PR1 Machine Guarding

3.12 S3AM-331-PR1 Underground Utilities

3.13 S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Confirm the development of the project SH&E Plan and compliance with this procedure.
- Confirm the appropriate equipment and materials are available to conduct the drilling, boring or direct-push operations.
- Confirm compliance with *S3AM-331-PR1 Underground Utilities.*
- Review the *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* prior to authorizing work to proceed.
- Confirm that employees conducting drilling, boring or direct-push probing possess any required training, registrations or certifications.
- Confirm all employees involved and affected by the task review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

4.1.2 **Safety, Health & Environment (SH&E) Manager**

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the project SH&E Plan to confirm compliance with jurisdictional regulations**.** Provide technical guidance as needed when a variance is pursued related to this procedure. Confirm variance process meets requirements identified in *S2-001-SM1 Global SH&E Management System Manual*.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g., ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training.*
- Review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and / or repairs.

4.2 Training

4.2.1 All on-site employees involved with drilling, boring, and direct-push probing shall be trained, at a minimum, in these procedures and in the procedures of *S3AM-331-PR1 Underground Utilities*.

4.2.2 All operators and assistants shall have the appropriate safety training based on the SH&E Training Matrix and any additional training assessments developed at the business group**,** and be versed in the equipment to be utilized.

- Refer to *S3AM-003-PR1 SH&E Training.*

- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.
- Only qualified personnel shall operate and inspect equipment.

4.2.3 All on-site Employees involved with drilling, boring, and direct-push probing activities shall be provided with on-site orientation of the drill rig and its operation.

4.2.4 All Employees involved with drilling, boring and direct-push probing activities at a client site shall receive the applicable client-required training**.**

4.3 Planning

4.3.1 SH&E Plan – At a minimum, a SH&E plan that includes a pre-job hazard assessment shall be prepared and communicated to all involved personnel prior to any drilling, boring, and direct-push probing activities. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

- Assessment shall include both overhead and subsurface utilities and installations. Refer to *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities*.
- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- All SH&E Plan requirements will be followed by the project team.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 A Task Hazard Assessment (THA) shall be completed before every assigned task at the work location. The focus of the analysis shall be on the specific assigned task and the evaluation of risks and assignment of control measures based on actual work conditions.

4.3.3 *S3AM-321- ATT2 Pre-Drilling, Boring & Direct-Push Probing Flow Chart* summarizes the key Pre-Drilling, Boring, and Direct-push probing requirements addressed in this procedure.

4.3.4 Procedures and documentation as detailed in *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities* shall be completed prior to any intrusive subsurface work.

- The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, mapped on a site plan and evidenced with appropriate surface markings.
- A site walk shall be conducted by the project team / site Manager and any other appropriate personnel, with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.
- All proposed subsurface activities will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.
- Appropriate clearance activities shall confirm location(s) of identified underground utilities and subsurface structures. Review the applicable completed *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.*
- Site Walks should be repeated as necessary following the clearance of subsurface utilities and installations to confirm hazards are clearly identified.

4.3.5 Confirm drilling location(s) and / or bore entry and bore exit points are adequately identified on the worksite to enable appropriate equipment positioning.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 Access agreements will be obtained and adhered to as necessary.

4.5 Pre-Qualifying and Re-Qualifying Drilling Subcontractors

4.5.1 All drilling subcontractors will be properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management*.

4.5.2 The qualifications of the drilling crew performing the work will be evaluated prior to each mobilization and each day by AECOM's on-site representative to assure that their safety performance, training, qualifications, equipment, processes, and approaches reflect AECOM standards for excellence.

4.5.3 All drilling subcontractor equipment will be properly maintained and properly equipped, and the drilling subcontractor will verify their equipment is fully functional as a normal part of their daily and pre-work routine. Refer to *S3AM-321-FM1 Daily Drilling, Boring & Direct Push Equipment Inspection.*

4.6 General Health and Safety

4.6.1 Personal Protective Equipment – Refer to the *S3AM-208-PR1 Personal Protection Equipment* for best practices. These requirements may be modified or expanded in the SH&E Plan. Clothing shall be close fitting and comfortable without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the rig.

- Depending upon the hazards present, additional PPE may be required such as fire retardant clothing, specific hearing protection, respiratory protective equipment and chemical protective clothing.
- If the location has potential for underground electrical utilities to be present, workers shall ensure footwear has additional protection of shock resistant soles required (white rectangle with omega symbol).

4.6.2 Hearing Conservation – Hearing conservation program requirements may apply when working around operating equipment. Refer to *S3AM-118-PR1 Hearing Conservation*.

- Each worker shall wear noise-reducing ear protectors around operating equipment or during elevated noise levels. Distance from the elevated noise level is the primary measure of control for non-essential drilling personnel.

4.7 Drilling, Boring and Direct Push Equipment Maintenance and Inspections

4.7.1 All equipment will be inspected prior to the initiation of operations and daily during operations using the *S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection*. This inspection is the responsibility of the operator who will provide written documentation of the inspection prior to the start of drilling each day.

- Equipment that is deemed defective will immediately be repaired by a qualified person, or, if repair is not practicable, tagged "Out of Service" and sent for repairs or discarded.

4.7.2 Managers shall confirm an accurate inventory of the equipment within their operation requiring scheduled maintenance is developed. Using applicable regulations, industry standards, best practices, and manufacturer's recommendations, a maintenance schedule shall be developed with defined responsibility, required actions, and frequency. Refer to *S3AM-321-FM2 Drilling, Boring, & Direct-Push Equipment Maintenance Inventory.*

4.7.3 The maintenance program for equipment shall:

- Adhere to applicable regulations, standards, and manufacturers' specifications;
- Provide for service by appropriately qualified maintenance personnel; and,
- Require maintenance schedules and records of maintenance.

4.7.4 Employees or operators who are assigned equipment are required to review maintenance schedules for that equipment and will confirm that required maintenance has occurred or see that it is undertaken.

4.8 General Requirements

4.8.1 Excluding geoprobe activities, set up any sample tables and general work areas for employees at a safe distance from the rig.

- The recommended safe distance is the height of the fully extended mast plus 5 feet (1.5 meters), and no less than 30 feet (9.1 meters) from the rig.
- An increase to this distance may be required due to noise exposure hazards. Refer to *S3AM-118-PR1Hearing Conservation.*

4.8.2 Operation of the drilling, boring or direct-push equipment shall be restricted to the designated operator except to activate the emergency shut-off as required.

- All rotary drilling equipment shall have an emergency shut off / kill switch. The location of the switch and operation should be reviewed with all involved Employees.

4.8.3 Sit-on direct push rigs are not permitted on AECOM worksites unless the rig has been modified (in accordance with manufacturer's requirements) to be operated by remote control or the rig has been manufactured with a rollover protection system and seat belt.

4.8.4 Consult jurisdictional regulations as use of J-hooks and cat-heads may be prohibited. Examples:

- 29 CFR 1926 requires derricks and cranes to use hooks with self-closing latches and permits the use of J-hooks only for a task unrelated to this procedure (setting trusses).
- British Columbia and Saskatchewan prohibit the use of friction cat-heads**.**

4.9 Identifying the Work Area

4.9.1 Ensure the work area is adequately identified:

- Including zone around the drilling, boring, or direct push equipment, as well as fluid equipment, entry point, exit point and any excavated areas.
- Utilize barricades, signage, pylons, snow fence, etc. as appropriate.
- Implement traffic control as necessary.
- Coordinate with concurrent operations to identify their associated hazards and controls, and communicate those associated with AECOM tasks.

4.9.2 When operating near public vehicular and pedestrian traffic, the on-site personnel shall take every precaution necessary to see that the work zone is properly established, identified, and isolated from both moving traffic and passer-by pedestrians (refer to *S3AM-306-PR1 Highway and Road Work*).

4.9.3 All traffic control devices shall be installed, placed, and maintained in accordance with a Traffic Control Plan, client specifications, and / or the Manual of Uniform Traffic Control Devices and Manual of Uniform Traffic Control Devices for Canada in Canada. Traffic control devices shall consist of and not be limited to

- Directional and informational signage;
- High visibility barricades, cones, or barrels;
- Lighting; and
- Other equipment and devices as required.

4.10 Clearing Work Areas

4.10.1 In addition to any minimum requirements the drilling subcontractor may have, prior to set up, adequate site clearing and leveling shall be performed to accommodate the rig and supplies and provide a safe working area.

4.10.2 Clearing the site includes clearing the intended drilling area obstacles and of underground utilities in accordance with *S3AM-331-PR1 Underground Utilities*.

4.10.3 Drilling or probing shall not commence when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

- The cleared / levelled area should be large enough to accommodate the rig and supplies.
- If the rig is positioned on a steep grade and levelling of the ground is impossible or impractical, the wheel of the transport vehicle shall be blocked and other means employed of preventing the rig from moving or toppling over.

4.11 Drilling Activities

4.11.1 Federal / State / Provincial / Territorial regulations that govern drill rig operations and exposed moving parts shall be adhered to.

4.11.2 All applicable client on-site safety procedures shall be understood and adhered to.

4.11.3 Minimum approach distances (MAD) from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These approach distances are a minimum; government regulations and utility requirements may dictate a greater set back distance and should be confirmed.

4.11.4 Verify that equipment / energy is isolated when lockout is required:

- Refer to operator's manual and *S3AM-325-PR1 Lockout Tagout*.
- Ensure stop switch is activated.
- Driller is out of the seat.
- Test controls to ensure they do not engage.

4.11.5 In addition to any identified minimum requirements (as applicable, client, drilling subcontractor), the following safety measures shall be taken during drilling, boring or probing operations on site:

- The operator and helper shall be present during all active rig operations.
- Site personnel shall remain within visual contact of the rig operator.
- Hard hats, approved safety boots, safety glasses, and hearing protection shall be worn in the work zone (minimum, the radius around the rig equal to the height of the drill rig mast) of a rig.
- Gas monitoring shall be conducted as appropriate.
- Hands, feet and other body parts shall be kept away from moving parts, (e.g. hoisted, rotating, pushing, etc.) including augers, drill rods and reamers.
- When observing drilling, stand upwind of the drill rig to prevent potential exposure to vapors that may be emitted from the borehole.
- The emergency shut-off switch on the rig shall be identified to site personnel and tested on a daily basis by the operator.
- Unauthorized personnel shall be kept outside of the established work zone.
- Rig crew and other worksite personnel shall not use a cell phone while operating the drill rig or other equipment or within the rig work zone.
- Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick) look up to check for overhead obstructions. Refer to *S3AM-322-PR1 Overhead Lines*.

- Before raising the mast (derrick), all rig personnel (with the exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the mast. All rig personnel and visitors should be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig shall be first levelled and stabilized with levelling jacks and / or solid cribbing.
    - The drill rig shall be releveled if it settles after initial set up.
    - Lower the mast (derrick) only when the levelling jacks are down, and do not raise the levelling jack pads until the mast (derrick) is lowered completely.
- After the rig has been positioned to begin drilling, all brakes and / or locks shall be set before drilling begins.
- The operator of a rig shall only operate a drill rig from the position of the controls. The rig shall not be in operation if the operator of the rig leaves the area of the controls.
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line should be used.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area.
    - Exhaust fumes can be toxic and some cannot be detected by smell.
    - Air monitoring and, as necessary, noise monitoring shall be conducted.
- Clean mud and grease from boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes shall be covered, protected, or backfilled adequately and according to Federal / State / Provincial / Territorial or local regulations on completion of the drilling project.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending and descending. Always use adequate fall protection and a full body harness when climbing above 6 feet (1.8 meters) of the ground. Do not attempt to use one or both hands to carry a tool while on a ladder. Use a hoist line and a tool “bucket” or a safety hook to raise or lower hand tools.

4.12 Drilling Fluid

4.12.1 Ensure drilling fluid is appropriate to the soil type and conditions to be encountered to enable smooth drilling.

4.12.2 Drilling fluid used in the boring process shall be contained at the entry and, as applicable, exit locations until recycled or removed from the site.

4.12.3 Confirm drilling fluid does not enter roadways, streams, municipal storm or sanitary sewer lines, and / or any other drainage system or body of water.

4.12.4 Monitor drilling equipment and fluid equipment for any leakage or spills. Confirm appropriate containment is in place and adequate spill response supplies are available.

4.12.5 It is important to monitor fluid flow and pressure gauges when drilling with any tooling, but it is essential when drilling with a mud motor (pump placed in the drill string to provide additional power to the bit while drilling).

4.13 Unanticipated Concrete / Debris or Void

4.13.1 The presence of subsurface installations and utilities requires special care when obstructions / refusal and voids are encountered and when unexpected absence of soil recovery occurs during

drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.

4.13.2 If unanticipated concrete / debris is encountered and / or if a void is encountered, drilling will be immediately discontinued and the Manager notified. Drilling may only proceed with Manager or SH&E Manager approval.

4.14 Use of Manual Slide Hammer

4.14.1 The following health and safety procedures should be followed when using a manual slide hammer to install shallow injection points, drive point piezometers, and drill tools:

- Only use a manual slide hammer that either attaches directly to the point / piezometer being driven or that incorporates a cap on the point / piezometer / drill tool that prevents the slide hammer from slipping off the point / piezometer / drill tool.
- Always grasp the manual slide hammer (handles if equipped with handles) with both hands while driving the point / piezometer / drill tool.
- Never allow hands or feet to get between the manual slide hammer and the drive plate or anvil.

4.15 Use of Augers

4.15.1 The following general health and safety procedures should be followed when supervising borings with continuous flight hollow-stem augers:

- Never place hands or fingers under the bottom of an auger section when it is being hoisted over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When augers are rotating, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Use a long-handled shovel to move auger cuttings away from a rotating auger. Never use hands or feet to move cuttings away from a rotating auger.
- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.
- Loud noises may occur while driving split spoons. At minimum hearing protection shall be worn when driving split spoons.
- When pulling / lifting augers, a clevis pin or other closed device shall be used. Use of J-hooks is prohibited.

4.16 Attaching and Breaking Rods

4.16.1 Do not use manual tools (e.g., pipe wrenches) in combination with rotation of the drill stem. Manual tools are not designed for the load, and may break.

- The use of such tools creates a significant impact hazard for those in the work area, because they rotate with the drill stem. Manual tool use in combination with a rotating drill stem to attach or break rods is therefore prohibited.
- Manual tools may be used if the drill stem is isolated / positively disengaged.
- Mechanical means of rod separation that are permitted include:
  - Opposing hydraulic controls.
  - Rod locking devices or machine's power vice.
  - Hydraulic breakout tools.
  - Hydraulic foot clamps.

4.16.2 Rod box changes present severe crushing hazards. Operators shall ensure all crew members are clear of the machine and hoisting equipment while they are changing rod boxes.

4.17 Rotary, Sonic and Core Drilling

4.17.1 In addition to the health and safety procedures identified above, the following general health and safety procedures should be followed when supervising borings with rotary, sonic and core drilling:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- When drill rods are rotating, stay clear of the rotating components of the drill rig. Never reach behind or around a rotating drill rod for any reason.
- Use a long-handled shovel to move cuttings away from the top of the borehole. Never use hands or feet to move cuttings away from the borehole.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Keep away from area where drill rods are being moved or raised to the rig. Do not stand in the area where a drill rod will fall or slide if it should be dropped.
- Loud noises may occur during drilling. Hearing protection shall be worn.

4.18 Direct-push

4.18.1 The following general health and safety procedures should be followed when supervising drilling borings with direct-push drilling:

- Loud noise may occur during direct-push drilling. Appropriate hearing protection shall be worn.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

4.19 Horizontal Directional Drilling

4.19.1 During surface to surface operations a 16.4’ (5 meters) safe zone shall be established and identified at both the entry and exit locations; no personnel are permitted to be within this zone unless the drill is locked out and the operator is out of the seat.

4.19.2 Machine shall be locked out before entering an excavation, changing tools, adding or removing drill stem or doing any other work on tools or the drill stem at the exit end of the bore.

4.19.3 A tracking head shall be installed on the drill stem:

4.19.4 Assemble drill head using components appropriate to the soil conditions to be encountered (e.g. nozzle, bit, beacon housing, etc.).

4.19.5 Ensure all personnel are clear of the bore entry point (outside of identified work zone).

4.19.6 At all times two way communication will be maintained at entrance and exit points using two way radios or equally effective communication means. If at any time communication is lost, all work will be stopped until communication is re-established

4.19.7 Locate drill head with tracking device at least every half-length of pipe. Adjust direction as necessary to follow the intended bore path.

4.19.8 Any drilling fluid returning to the surface shall be cleaned up promptly.

4.19.9 Drill pipe should exit the bore at an angle of 5 to 10° from the ground surface.

4.19.10 Turn off fluid flow as soon as drill head emerges.

4.19.11 Lockout machine and remove drill head using appropriate breakout tools.

4.19.12 Select and attach a reamer that allows the return of drilling fluids and cuttings, to reduce frictional pullback forces, and to allow for bend radius of the pipe. Reamer shall be:

- The smaller of 1.5 times the outside diameter (O.D.) or 12 inches (300mm) larger than the diameter of the product pipe.
- A diameter less than 1.5 times the diameter of the product may be necessary in collapsing soil formations.
- Reamed diameter may need to be increased by up to 25% if substantial swelling of the soil is expected to occur.

4.19.13 All personnel shall clear the trench or the designated surface zone (16.4 feet [5 meters]) once the reamer is attached. Operator shall only reverse lockout and commence pullback when communication is received from personnel on exit hole side and operator has confirmed the message.

4.19.14 Personnel on exit hole side shall ensure reamer is pulled the entire way back to the exit hole.

- If rotation is started when drill rod and reamer are away from the exit hole, very fast sideways movement of the rod and reamer can occur.
- Larger reamers and longer lengths of exposed drill rod increase the speed and distance of this movement.

4.19.15 If working with trailing drill stem, swivels shall be verified as lubricated and rotating freely by hand prior to use:

- A freely moving swivel prevents trailing drill stem or product from rotating / whipping.
- If the swivel does not move freely by hand it shall be removed from service and repaired or replaced.
- Only use swivels with limited articulation to prevent whipping or cranking action between the reamer and trailing drill pipe or product.

4.19.16 It is important to clean and lubricate the tool and drill stem joint threads before each use.

4.19.17 Any individual drill pipes that are bent or damaged shall be immediately taken out of service.

4.19.18 Occasionally change the order of the lead drill pipe (i.e. move the lead pipe to the end of the stem, or other pipe rotation procedures) to extend drill stem life.

4.19.19 Operator should avoid stalling the pipe rotation to avoid stress damage from shock loading.

4.20 Drilling at Potential MEC / UXO Sites

4.20.1 If the project site is suspected of containing munitions and explosives of concern (MEC) or unexploded ordnance (UXO), the UXO team will conduct a reconnaissance and MEC / UXO avoidance to provide clear access routes to each site before drilling crews enter the area. The following procedures will be implemented:

- Drilling operations on an MEC / UXO site will not be conducted until a complete plan for the site is prepared and approved by the AECOM UXO Safety Officer. MEC / UXO avoidance shall be conducted during drilling operations on known or suspect MEC / UXO sites.
- The UXO team will identify and distinctly mark the boundaries of a clear approach path for the drilling crews, vehicles, and equipment to enter the site. This path will be, at a minimum, twice the width of the widest vehicle. No personnel will be allowed outside any marked boundary.
- If MEC / UXO is encountered on the ground surface, the UXO team will clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
- The UXO team will conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of MEC / UXO that may be in the subsurface. If a magnetic anomaly is encountered, it will be assumed to be MEC / UXO, and the approach path will be diverted around the anomaly. UXO personnel only will operate the appropriate geophysical instrument and identify MEC / UXO.
- An incremental geophysical survey of the drill-hole location(s) will be initially accomplished by the UXO team using a hand auger to install a pilot hole. If MEC / UXO is encountered or an anomaly cannot be positively identified as inert material, Hazardous, Toxic, and Radioactive Waste (HTRW) sampling personnel will select a new drill-hole location.
- Once the surface of a drilling site has been cleared and a pilot hole established as described above, the drilling contractor will be notified that the site is available for subsurface drilling.

4.21 Movement and Transport of Drilling, Boring or Direct-Push Equipment

4.21.1 Personnel transporting equipment shall be properly licensed and shall operate the vehicle according to Federal / State / Provincial / Territorial, and local regulations. Refer to *S3AM-005-PR1 Driving* and *S3AM-320-PR1 Commercial Motor Vehicles*.

4.21.2 Confirm the traveling height (overhead clearance), width, length and weight of the equipment with the carrier. Identify highway and bridge load, width and overhead limits, to confirm these limits are not exceeded and with adequate margin.

4.21.3 Allow for overhang of any drilling, boring or direct-push equipment when cornering or approaching other vehicles or structures.

4.21.4 Be aware that the canopies of service stations and motels are often too low for equipment loaded on a trailer to clear

4.21.5 Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.

4.21.6 Never travel on a street, road, or highway with any part of the drilling, boring or direct-push equipment in a raised or partially raised position.

4.21.7 Remove all ignition keys if rig is left unattended unless client requirements specify that the keys remain in the ignition switch at all times.

4.21.8 Before moving a rig on location, the operator shall do the following:

- To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
- Check the brakes of the truck / carrier, especially if the terrain along the route of travel is rough or sloped.
- Discharge all passengers before moving on rough or steep terrain.

4.21.9 Engage the front axle (on 4x4, 6x6, etc., vehicles) before traversing rough or steep terrain

4.21.10 Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator shall conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility shall be considered that the presence of

drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).

4.21.11 Logs, ditches, road curbs, and other long and horizontal obstacles should be approached and driven over squarely, not at an angle.

4.21.12 When close lateral or overhead clearance is encountered, or when backing up, the driver of the rig shall be guided by another person on the ground.

4.21.13 Loads on the drill rig and truck shall be properly stored while the truck is moving, and the mast shall be in the fully lowered position.

4.22 Loading and Unloading

4.22.1 Consult applicable manufacturer's recommendations for loading and unloading of the equipment.

4.22.2 Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.

4.22.3 Load and unload on level ground.

4.22.4 Use the assistance of someone on the ground as a guide.

4.22.5 Check the brakes on the rig carrier before approaching loading ramps.

4.22.6 Distribute the weight of the rig, carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the height of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.

4.22.7 The rig and tools should be secured to the hauling vehicle with ties, chains, and / or load binders of adequate capacity.

5.0 Records

5.1 All employee training files shall be maintained in accordance with *S3AM-003PR1 SH&E Training*.

5.2 Completed inspections and maintenance inventories shall be maintained the site or project files.

6.0 Attachments

6.1 S3AM-321-ATT1 Core Drilling Machine

6.2 S3AM-321-ATT2 Pre-Drilling, Boring, & Direct-Push Probing Flow Chart

6.3 S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection

6.4 S3AM-321-FM2 Drilling, Boring & Direct-Push Equipment Maintenance Inventory

Americas

Core Drilling Machine

S3AM-321-ATT1

1.0 Objective / Overview

1.1 Core drilling machines are used on all types of jobs. They can be electrical or gas powered and come with a stand or can be hand held. Caution should be used when operating such a machine. It may look harmless and easy to run, but drilling machines have many hazards.

1.2 Prior to coring activities the location should be checked for buried utilities in accordance with *S3AM-331-PR1 Underground Utilities*.

2.0 Safe Operating Guidelines

2.1 Clean the flanges before mounting the blade.

2.2 Make sure the blade is correct for the material being cut and that the arrow on the blade corresponds with the direction of rotation of the machine spindle.

2.3 Use built-in vacuum or bolt-down anchors depending on the type of surface to be cored. Do not bypass anchoring system.

2.4 Properly manage power cable for electric units to prevent slips, trips or falls by the operator or those nearby.

2.5 Avoid tilting the blade when cutting.

2.6 Use only the machines that have an approved safety guard.

2.7 Remove the diamond blade from the machine during transit to prevent accidental damage.

2.8 Inspect the blades frequently to detect cracks or undercutting of the steel center.

2.9 Do not let excessive heat be generated at the cutting edge of the blade.

2.10 Use adequate water supply to both sides of the blade.

2.11 Follow the manufacturers recommended pulley sizes and operating speeds for specific blade diameters.

2.12 Make sure to tighten drive belts to ensure full available power.

2.13 Don't force the blade on the blade shaft or mount blade on an undersized spindle.



3.0 Potential Hazards

3.1 Utilities

3.2 Electricity

3.3 Flying debris

3.4 Noise exposure

3.5 Inadequate housekeeping

3.6 Fumes or dust

3.7 Pinch points

3.8 Binding/biting – torque control

4.0 Training Requirements

4.1 Review of applicable SOPs (e.g., *S3AM-305-PR1 Hand & Power Tools*; *S3AM-302-PR1 Electrical Safety*).

4.2 Demonstrated knowledge on the use of a coring machine.

4.3 Review and follow manufacturers' operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Hard hat

5.2 Safety Vest

5.3 Leather gloves

5.4 Face shield

5.5 Steel-toed/composite-toed boots

5.6 Hearing protection

5.7 Respirator or dust mask (as applicable to the respiratory hazards)

6.0 Other Safety Tips

6.1 Keep fingers and hands away from the cutting edge.

6.2 Hold handle firmly when operating.

6.3 A subsurface utility clearance shall be performed prior to initiating drilling operations.

6.4 Stand firmly and apply body weight at anchored side of guarded platform.

Americas

Pre-Drilling, Boring & Direct Push Probing Flow Chart

S3AM-321-ATT2

Before Any Drilling, Boring and Direct Push Probing Activities

PERMITS and ACCESS AGREEMENTS

- **Government and Utility/Infrastructure Permits**
- **Client Permits and Procedures**
- **Access Agreements**

KEY POINT: Obtain all permits and sign Access Agreement (if required).

GENERAL HEALTH and SAFETY

KEY POINT: Prepare SH&E Plan, as well as Task Hazard Assessments (THA).

IDENTIFICATION and MAPPING OF UTILITY and SUBSURFACE STRUCTURES

KEY POINT: Generate a comprehensive site map illustrating known locations of overhead/subsurface utilities, subsurface structures, and proposed boring locations.
Review completed *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist*.

SITE WALK

KEY POINT: Perform a site walk utilizing site map and 360 degree view to verify known conditions, including overhead obstructions or hazards, and identify potential issues. Add discovered items/issues to map for use in location confirmation.

PROPOSED SUBSURFACE INVESTIGATION LOCATIONS

KEY POINT: Confirm that locations meet the minimum required set-back distances.

UTILITY CLEARANCE INVESTIGATION LOCATION CONFIRMATION

KEY POINT: Visually verify hand clearance. Review completed *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist*.

DRILL RIG INSPECTIONS

KEY POINT: Drill rig inspected and documented daily by operator prior to drilling.

BEGIN DRILLING, BORING OR DIRECT PUSH PROBING

KEY POINT: Prior to commencing any intrusive subsurface work, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* shall be completed.
Upon commencing the work, if unanticipated conditions or events are encountered (e.g. concrete/debris, void encountered, etc.) stop work and notify the Manager. Authorization to proceed shall have the concurrence of the Manager, Site Supervisor and SH&E Manager.

Americas

Drilling, Boring & Direct-Push Equipment Maintenance Inventory

S3AM-321-FM2

Equipment (*Make, Model, Serial #*)	Equipment Owner	Equipment Status (*On Hire, Active, Decommissioned*)	Frequency of service	Service Type	Manufacturer's Standards	Industry Standards	Legislated Requirements	Location of Equipment

Americas

Driving

S3AM-005-PR1

1.0 Purpose and Scope

1.1 The purpose of this document is to establish policies and procedures for operation of AECOM-owned, rented, or leased vehicles, client or customer-owned vehicles, and personal vehicles used by AECOM employees.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content. Policies and procedures related to the operation of commercial motor vehicles are in addition to this procedure; refer to *S3AM-320-PR1 Commercial Motor Vehicles.*

2.0 Terms and Definitions

2.1 **AECOM Business** – Any activity that is performed in the name of AECOM. This includes, but is not limited to, vehicle travel between work locations, client sites, meeting locations as well as driving performed as a part of work-related travel (e.g., driving to and from airports, hotels, train stations). AECOM business does not include driving that is a part of a daily routine commute from home to an AECOM location.

2.2 **Authorized Driver** – AECOM employees who receive manager approval following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducting AECOM business. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. There are three categories of Authorized Drivers;

- Professional (AECOM employee who operates a commercial motor vehicle. Please refer to *S3AM-320-PR1 Commercial Motor Vehicles*).
- Hired (Employee's specific AECOM role is to drive employees in a normal street vehicle, which may or may not require commercial licensing by the applicable authorities. This category does not include busses or vans with a capacity of more than 12 people.).
- General (Driving is required as a part of the employee's job duties. This includes driving AECOM-owned, leased, or rented vehicles, client or customer-owned vehicles, or personal vehicles on AECOM business).

2.3 **Collision** – Any incident in which a motor vehicle that (whether in motion, temporarily stopped, or parked) makes contact with another vehicle or pedestrian, or results in property damage and/or bodily injury, regardless of who was injured, what property was damaged, or who was responsible.

2.4 **Commercial Motor Vehicle (CMV)** – Any self-propelled or towed motor vehicle used for AECOM business (e.g., to transport passengers or property) when the vehicle is one of the following:

- Has a gross vehicle weight rating (GVWR) or gross combination weight rating equal to or greater than the weight specified by the applicable jurisdiction (e.g.,U.S. ≥ 10,001 pounds [4,536 kilograms]); or
- Is designed or used to transport more than the number of passengers specified by the applicable jurisdiction, including the driver, for compensation; or
- Is designed or used to transport more than the number of passengers specified by the applicable jurisdiction, including the driver, and is not used to transport passengers for compensation; or
- Is used in transporting hazardous material in quantities ≥ 1,001 pounds (454 kilograms) combined total weight at any time.
- Refer to *S3AM-320-PR1 Commercial Motor Vehicles* for additional information.

2.5 **Distracted Driving** – An activity that takes the driver's attention away from the primary task of driving.

2.6 **Driving Under the Influence (DUI)/Driving While Intoxicated (DWI)** – The operation of a vehicle while under the influence of alcohol, drugs, medications, or other substances capable of inducing an altered mental state and/or impairing physical and mental judgments, such that the influence of the substances produces impairment in violation of the applicable governmental laws.

2.7 **Fatigue** – A general term used to describe the experience of being "sleepy", "tired" or "exhausted". The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

2.8 **Incident** – For the purposes of this procedure, a vehicle collision or other event where personal injury or property damage occurs, or where a citation is issued while the employee is on AECOM business. This may also include acts of theft, vandalism, and criminal mischief.

2.9 **Journey Management** – A process for planning and executing necessary journeys safely.

2.10 **Local Laws** – Signs, postings, laws, regulations, ordinances and codes applicable for the jurisdiction in which the motor vehicle is being operated.

2.11 **Motor Vehicle Report (MVR) / Driver's Abstract** – A listing of the tickets (violations), incidents collision for an individual driver over a period of time (e.g., 3 years, 5 years) provided by a state or provincial authority such as the Department of Motor Vehicles.

2.12 **Personal Vehicle** – A motorized vehicle owned or leased by an employee.

2.13 **Portable Electronic Device** – A mobile electronic device that is used to receive or communicate voice, email, internet, and/or public media. The device requires user interaction (typing, dialing, reading, keying, etc.) that distracts the motor vehicle operator. Example devices include, but are not limited to:

- Mobile Communication Devices (MCD)
  - Mobile/Cellular phones
  - Two-way Radios
- Personal Data Assistant (PDA)
- iPads, iPods, or other tablet models
- Computers
- Global Positioning System (GPS) receivers

2.14 **Spotters –** Extra personnel that may provide guidance when maneuvering in close and/or complex situations in order to avoid the occurrence of an incident.

2.15 **Task Hazard Analysis (THA)** – A tool for evaluating work activities for the purpose of:

- Identifying the SH&E hazards and risks associated with the activity being performed;
- Identifying and implementing control measures to eliminate or reduce hazards and risks; and,
- Evaluating the effectiveness of control measures and making modifications as needed.

3.0 References

3.1 AECOM Global Travel Policy

3.2 RS2-001-PR Firearms Standard

3.3 S3AM-003-PR1 SH&E Training

3.4 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.5 S3AM-009-PR1 Fatigue Management

3.6 S3AM-010-PR1 Emergency Response Planning

3.7 S3AM-209-PR1 Risk Assessment & Management

3.8 S3AM-314-PR1 Working Alone

3.9 S3AM-319-PR1 All-Terrain Vehicles

3.10 S3AM-320-PR1 Commercial Motor Vehicles

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Confirming employees are informed of the provisions of this procedure and related vehicle procedures.
- Providing a copy of this procedure to an employee who will be driving an AECOM-owned, leased or personal vehicle for AECOM business.
- Allowing employees to designate time to complete required driving safety training, vehicle inspections and related activities.
- Assigning driving tasks to authorized employees only.
- Selecting and providing vehicles for use by authorized employees that are appropriate for the planned working conditions and environment.
- Supporting employees in the reporting of vehicle incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations,* including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Confirm notification of AECOM Human Resources and Counsel upon receipt by an employee of a legal summons associated with a moving violation related to the use of a company vehicle.

4.1.2 **Employee**

- Follow this procedure and applicable laws while operating a vehicle.
- Complete assigned driver safety training based on the training matrix and any additional training assessments developed at the business group. Refer to *S3AM-003-PR1 SH&E Training, including S3AM-003-FM1 SH&E Training Matrix*.
- Report to the Manager / Supervisor if the vehicle selected is not appropriate for the working conditions and environment.
- Report to the Manager / Supervisor if the employee is inexperienced in operating the type of vehicle assigned.
- Report to the Manager / Supervisor if the employee is inexperienced in driving in the type of working conditions and environment assigned.
- Review the completed Task Hazard Assessment and complete journey management. If required, document the Journey Management Plan using *S3AM-005-FM1 Journey Management Plan* or equivalent.
- Immediately report vehicle incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations*, including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Notify the appropriate Manager / Supervisor and SH&E Manager upon receipt of a legal summons associated with a moving violation related to the use of a company vehicle.
- Immediately report a change or limitation(s) to his/her Driver's License to the appropriate AECOM Human Resources representative or his/her Manager / Supervisor.

- Conducting a pre-operational inspection of the vehicle for damage or deficiencies and reporting discovered deficiencies affecting the safe operation of the motor vehicle to the appropriate authority (e.g., supervisor, rental car agency, etc.).

4.1.3 **SH&E Manager**

- Maintaining and updating training resources for vehicle and driver safety.
- Providing guidance.
- Assisting operational leaders with determining the risk incurred by the use of motor vehicles.
- Assist in the incident investigation and review process.

4.2 General Procedures and Practices

4.2.1 Only Authorized Drivers are to operate a motor vehicle (rental, personal, client or customer-owned, or AECOM-owned/leased) while on AECOM business.

4.2.2 Drivers must comply with *AECOM's Global Travel Policy* and applicable laws, and employ safe driving practices. (NOTE: *Individual state, provincial, and local laws vary.*) Refer to *S3AM-005-ATT1 Authorized Driver Safety Practices*.

4.2.3 Authorized Drivers shall confirm their operating license is on their person, and valid registration and insurance is maintained with the respective vehicle prior to operation.

4.2.4 All local laws including, signs, postings, regulations, ordinances, and codes applicable for the jurisdiction in which the motor vehicle is being operated shall be adhered to.

4.2.5 At-risk driving behavior by AECOM employees shall be identified and managed accordingly.

4.2.6 Authorized Drivers must be at least 18 years of age (noncommercial license) or 21 years of age (commercial license) and have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency). Employees with conditional licenses are prohibited from operating vehicles on AECOM business.

4.2.7 If an Authorized Driver receives a citation resulting in their license being suspended, has his/her driver's license revoked, or is otherwise unauthorized to drive, he/she shall notify the appropriate AECOM Human Resources representative or his/her Manager prior to start of the following work day. Failure to do this may result in disciplinary action up to and including termination.

4.2.8 The office to which the vehicles are registered is liable for any damages to the vehicle being operated by an Authorized Driver.

4.2.9 Seat belts are to be worn by the occupants. The number of passengers shall not exceed the manufacturer's specifications for the vehicle.

4.2.10 The vehicle may not move until all passengers have fastened their restraints in the proper manner (e.g., lap belt secured and shoulder harness placed over the shoulder). Vehicles are not to be operated or used by AECOM employees if seatbelts are not included as part of the vehicle's safety equipment.

4.2.11 The vehicle's engine is to be turned off during refueling. Smoking or cellular phone use is not allowed while refueling.

4.2.12 Motorcycles may not be operated on AECOM business unless the following requirements are met:

- Specific approval is provided by the Supervisor with concurrence from the SH&E Manager.
- A hazard analysis is completed.
- Required training and license is in place.
- Headlights or daytime running lights will be used when the vehicle is in operation.
- A Class 2 or 3 safety vest and appropriate helmet shall be worn while operating a motorcycle.

4.2.13 When practical, drivers should travel during daylight hours and avoid driving during adverse weather conditions. Drivers should also inform colleagues of their travel itinerary including destination and anticipated departure and arrival times.

4.2.14 Fire arms and weapons are not permitted in AECOM-owned, leased or rented vehicles insured by AECOM. Firearms and weapons in personal vehicles are subject to the laws and regulations of the respective local, provincial, state, territory, federal and region and/or country. Refer to the *RS2-001-PR1 Firearms Standard*.

- Exceptions to this standard may exist where there is a credible and demonstrated risk to AECOM employees or assets, or when knives or weapons are required as part of the work activity. Under such circumstances, the exception must be approved by the Chief Resilience Officer, and must strictly adhere to the procedures set forth by the Global Resilience Group.

4.2.15 Vehicles are to be selected based on the nature of planned use. In some working conditions, specialized vehicles, such as four-wheel drive and higher clearance vehicle, may be required to confirm safe travel. These specialized vehicle requirements/specifications shall be identified in the project specific SH&E Plan and/or THA.

4.2.16 Vehicles are to be maintained according to manufacturer's specifications and the applicable environmental and operating factors (e.g. winterized with appropriate fluids, winter tires installed, appropriate coolant for hot climates, etc.).

4.2.17 Vehicles are to be outfitted with the appropriate support equipment based on the THA or client vehicle specifications. Support equipment may include, but is not limited to, cones, rotating warning lights, warning flags, vehicle identification (magnetic door signs or similar), wheel chocks, cargo nets, and rollover protection.

4.2.18 Drivers are to operate vehicles in a manner that avoids situations where backing is necessary. Whenever possible and as permitted, reverse parking of all vehicles while on business is required. A spotter shall be used when backing of trucks and heavy equipment presents a risk of collision.

4.2.19 Non-AECOM drivers (those other than AECOM employees [e.g., subcontractors, joint venture partners, clients, etc.]) are prohibited from operating an AECOM company owned, leased or rented vehicle unless the activity is specifically agreed to in the applicable contract and only if the use of the vehicle is consistent with the terms of the contract.

4.2.20 Authorized drivers required to operate vehicles with special hazards (e.g., trucks carrying fuel cells, vehicles used to tow trailers, vehicles with limited visibility, etc.) will be thoroughly briefed on the hazards and control measures necessary for safe operation of the vehicle. The local AECOM operation will maintain documentation of the briefing.

4.2.21 Define specific vehicle travel routes and parking areas at field sites through the use of fencing, cones, or other markings.

4.2.22 When a vehicle will be left unattended without an authorized driver in the driver's seat, the vehicle must be turned off, placed into park (or gear for manual transmissions), and the emergency brake set. When parked on a grade, the wheels or tracks of mobile equipment shall be either chocked or turned into a bank.

4.3 Distracted Driving

4.3.1 Distractions while driving are a major cause of incidents. Distractions include the use of cellular phones (including texting), eating, drinking, smoking, and engaging in intense conversations. AECOM Authorized Drivers must exercise proper control of the vehicle at all times, including the management of possibly distracting actions and behaviors.

4.3.2 The use of portable electronic devices that may distract the driver while driving is prohibited. This includes cell phones, two-way radios and other items whether hand-held or hands-free. Electronic devices include, but are not limited to, all mobile phones pagers, iPods, MP3s, GPS units, DVD players, tablets laptops and other portable electronic devices that can cause driver distraction.

- Employees shall not use a personal or company mobile communication devices (MCD) while driving any vehicle on AECOM business.
- Employees shall not use a company MCD while driving a personal vehicle.
- Driving includes the time spent in traffic or while stopped at red lights or stop signs.

4.3.3 GPS units and devices (e.g., smart phones, tablets) used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Note: windshield mounting brackets are not permitted in many jurisdictions, with dashboard mounts being acceptable. Consult jurisdictional requirements.

4.3.4 Electronic devices shall be setup for operation prior to commencing driving activities and shall not be changed by the driver while driving.

4.4 Impairment

4.4.1 Impairment can take many forms ranging from fatigue, to the use of prescription medication or alcohol (even small amounts), to the abuse use of illegal and legal drugs and alcohol. AECOM employees shall not drive in an impaired condition.

4.4.2 AECOM employees are prohibited from being under the influence of alcohol or drugs or improperly using medication in a way that could diminish, or raise questions concerning, an employee's ability to perform at his or her best while performing services for or on behalf of AECOM. Operation of vehicles while under the influence may void insurance coverage.

4.4.3 Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another healthcare provider, or the manufacturer (e.g., instructions on the label) the medication could render the activity unsafe.

4.4.4 AECOM employees are prohibited from operating a vehicle if they are experiencing signs and symptoms of fatigue. Employees should stop work and rest before driving. No employee should operate a vehicle if they have worked 14 consecutive hours within a 24 hour period. Refer to *S3AM-009-PR1 Fatigue Management*.

4.5 Journey Management

4.5.1 When practical, alternatives to road travel should be evaluated including teleconferencing/video conferencing, the use of public transportation or carpooling.

4.5.2 Journey management is a process for planning and executing necessary journeys safely and may or may not be documented. Review the completed THA and complete the journey management process. If required, document a Journey Management Plan (JMP) using *S3AM-005-FM1 Journey Management Plan* or equivalent. The journey management process includes the following steps:

- Determining if the trip is necessary.
- Evaluating alternative safer modes of transport.
- Evaluating the potential to combine journeys with others.
- Planning the trip.
- Select the safest and most efficient route. Confirm compliance with any site specific specified routes, route rules, or restrictions.
- Confirm route planning factors in fatigue management. Refer to *S3AM-009-PR1 Fatigue Management*.
- Review road conditions and potential hazards associated with the route.
- Review weather conditions and forecast.
- If applicable, review *S3AM-314-PR1 Working Alone*.
- Confirm Emergency Response Plan includes procedures to be taken in the event of a collision or vehicle incident.
- Allow for adequate travel time.
- Inform others of destination, estimated time of arrival and routing.

4.5.3 Drivers who are to undertake trips in excess of 250 miles (400 km) each way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a JMP. This plan typically includes the route, location of route hazards, timing, rest periods and locations, communications, emergency response and security arrangements.

4.5.4 Drivers are responsible for developing the JMP and coordinating with the applicable parties identified in the plan.

4.6 Driver Safety Training

Authorized drivers shall have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency).

Driver safety training is to be assigned based on the risks posed with the work environment, driver type and vehicle type, using the training matrix and any additional training assessments developed at the business group level. Refer to *S3AM-003-PR1 SH&E Training, including S3AM-003-FM1 SH&E Training Matrix*. A determination of training type is at the discretion of the Manager / Supervisor, with the following guidance applied.

4.6.1 All Authorized Drivers (Professional, Hired, and General Drivers) shall be trained in this procedure; *S3AM-005-PR1 Driving*.

4.6.2 All Authorized Professional Drivers shall be trained in *S3AM-320-PR1 Commercial Motor Vehicles.*

4.6.3 Vehicle / Driver Safety Training

- Recommended for all employees who drive on behalf of AECOM (Professional, Hired and General Drivers).
- This may be completed online (e.g., AECOM University – Driver Safety).
- Recommended to be completed within 1 month of the Authorized Driver’s hire date.

4.6.4 Defensive Driver (online) Training

- Recommended for all Authorized Drivers (Professional, Hired, and General Drivers) who are assigned an AECOM company owned, leased or rented vehicle for a significant period of time with the expectation that the employee utilizes the vehicle on a regular basis for AECOM business.
- It is recommended that authorized drivers who have completed web-based defensive driver training or equivalent also complete a refresher every three years.
- Defensive Driver training is available online through AECOM University (e.g., Alert Driving Basic, Alert Driving Skills) or one of the following AECOM-approved training resources:
  - The National Safety Council
  - Alert Driving

4.6.5 Defensive Driver (hands-on) Training

- Recommended for all Authorized Professional Drivers and Authorized Hired Drivers.
- Recommended for Authorized General Drivers who drive in remote locations, hazardous environments (such as refineries, ports, terminals etc.), at-risk drivers, and when required by clients.
- Defensive Driver hands-on training is provided through an AECOM-approved training resource, such as Smith Systems.
- Hands on defensive driver training may be required as a result of an incident or negative Motor Vehicle Report.

4.6.6 Driver Retraining

- Drivers involved in repeated motor vehicle incidents, incidents of sufficient severity or concern, or drivers identified as at-risk through review of their Motor Vehicle Report/Driver Abstract may

be retrained or, as applicable, subject to disciplinary action and refused the right to drive on behalf of AECOM.

- Retraining programs will be implemented at the discretion of the Supervisor and SH&E Manager.
- Employees eligible to continue driving shall be subject to a driver retraining program that may include any of the above programs or other training programs appropriate for the type of driving the employees performs.

4.6.7 Special Vehicles and Driving Conditions

- Vehicles such as All-Terrain Vehicles (ATVs), four wheel drive vehicles, motorized carts, snowmobiles, box vans and trailers (towing) require specialized training and supervision. For ATVs, Refer to *S3AM-319-PR1 All-Terrain Vehicles* for additional information.
- Use of these types of vehicles is limited to AECOM projects, therefore training and qualification programs for drivers will be project specific. The Manager / Supervisor shall work with the SH&E Manager to tailor training to the specific needs of the project.

4.7 Personal Vehicles (additional requirements)

4.7.1 The requirements of this procedure apply to the use of a personal vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.7.2 Personal vehicles driven by Authorized Drivers for business use must satisfy the jurisdiction's registration and inspection requirements and may not be modified beyond manufacturer's specifications.

4.8 Rental Vehicles (additional requirements)

4.8.1 The requirements of this procedure apply to the use of a rental vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.9 Requirements for Authorized Drivers

4.9.1 Review the *S3AM-005-ATT1 Authorized Driver Safety Practices* for specifics.

4.9.2 Drivers are not to permit unauthorized persons to operate an AECOM-owned/leased/rented vehicle.

4.9.3 All Authorized Drivers shall perform a walk-around inspection of the vehicle prior to operation.

4.9.4 Pre-operation vehicle inspections shall be performed and documented by all Authorized Professional Drivers and all Authorized Hired Drivers. A sample vehicle inspection checklist is provided in *S3AM-005-FM2 Vehicle Inspection Checklist*.

4.9.5 Vehicles with deficiencies that affect or could potentially affect the safe operation of the vehicle shall be removed from service and promptly repaired as necessary to permit safe vehicle operation.

4.9.6 As applicable, arrange for and/or coordinate with appropriate AECOM personnel to facilitate preventive maintenance services for the vehicle. Maintain it in sound mechanical condition, as per the manufacturer's recommendations provided in the owner's manual.

4.9.7 Do not operate the vehicle if unsafe maintenance conditions exist that would likely result in vehicle damage or personal injury. This applies to vehicles owned or leased by AECOM and to personally-owned vehicles used for AECOM business. Escalate other maintenance issues for correction to appropriate authority (e.g., manager, rental car agency, supervisor, etc.).

4.9.8 Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service. Only drive vehicles in conditions for which the driver has the appropriate training and experience.

4.9.9 AECOM-owned, rented, or leased vehicles are for official business use only and are not to be used for personal activities. Exceptions to this requirement can be made only with the specific written approval of the Manager of the office or location the vehicle is registered to.

4.9.10 Smoking (including the use of e-cigarettes) and chewing tobacco is not permitted in AECOM-owned, leased or rented vehicles.

4.9.11 Drivers are responsible for damage caused by abuse of the vehicle.

4.9.12 Secure the vehicle when left unattended.

4.9.13 Securing loads in the inside and outside compartments of the vehicle.

- Do not rely on weight/shape of load alone. Always use a cargo net, straps, containers or other mechanical device when necessary to confirm load is secure.
- Mark loads that extend the beyond the end of truck, trailer or similar edge with a red warning flag of at least 16 square inches.
- Red lights will be utilized at night to mark loads that extend the beyond the end of truck, trailer or similar edge.

4.9.14 Do not modify existing equipment (warning sounds, backing alarms etc.) or install aftermarket equipment including toolboxes, truck caps, specialty lights, or towing equipment) without approval from the Manager of the office or location the vehicle is registered to and AECOM Procurement Department.

4.10 Emergency Preparedness

4.10.1 AECOM-owned or leased vehicles are to have a “Safety Kit” that contains a first-aid kit, portable fire extinguisher, safety triangle, and two reflective safety vests. If not available, contact the Manager / Supervisor or SH&E Manager to determine how to obtain a kit.

4.10.2 The following suggested items should be kept in vehicles used for AECOM business in remote project locations:

- First aid kit, appropriate to the work and crew size, or per regulations.
- Fire extinguisher, safety triangle, and safety vest.
- Emergency equipment (e.g., flares, flashlight, blanket, drinking water, etc.) based on conditions.
- Means of communication (cell phone, radio or satellite phone), extra batteries or a charger.

4.10.3 To the extent possible, employees should refrain from changing tires or making repairs to vehicles in the field.

- A road side assistance service should be identified for vehicles used for AECOM business in advance travel.
- If changing tires or making repairs to vehicles is necessary in the field, assessment of hazards shall be completed and all applicable safe procedures and manufacturer’s specifications shall be followed.

4.10.4 Specific emergency procedures are to be identified in the applicable Emergency Response Plan, JMP or the THA. Refer to *S3AM-010-PR1 Emergency Response Planning*.

4.11 Vehicle Incidents

4.11.1 Vehicle incidents are to be reported and managed in accordance with *S3AM-004-PR1 Incident Reporting, Notifications and Investigation* regardless of how minor the incident might be.

4.11.2 The Employee(s) involved in a collision shall follow the below guidelines:

- Assess the situation to confirm everyone is safe, and remove any vehicle occupants from harm’s way. Call, or have someone else call 911 immediately, if necessary.
- As appropriate, remain at the scene of a collision to contact the police. Ask another motorist to call the police if necessary; never leave the scene of a collision.

- As applicable, provide (if requested) to police and the other driver(s) the liability insurance information. Obtain the officer's jurisdiction, name, and badge number and a copy of the police report.
- As applicable, consider moving the vehicle out of the traffic flow if it is safe to do so, the vehicle is operational, and/or no further damage to the vehicle can occur.
- Do not operate a damaged vehicle if its safety is questionable, its operating condition is illegal by applicable laws or its condition is such that further damage would likely result from its operation.
- Turn on the vehicle's flashers to warn other motorists.
- Obtain:
  - Names, phone numbers, and addresses of owner(s), driver(s), and occupants of the other car(s) involved.
  - Other party's insurance company's name, address, phone number, policy number, and insurance agent.
  - Names, phone numbers, and addresses of all witnesses.
  - Photographs of the accident scene when safe to do so.
- Cooperate with AECOM Counsel if the incident results in unresolved risks or third party claims, or if the employee receives a summons, complaint or other legal documents relating to a traffic incident.
- DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.
  - Statements made in haste or anger may be legally damaging.
  - If contacted by a third party, do not answer any questions. Immediately report this contact to the Manager / Supervisor and/or Legal Counsel
- Employees shall report the incident to AECOM's Global Travel Department. If the incident involved a third party, the driver is responsible for obtaining a copy of the police report and providing to global travel

4.11.3 Employees must cooperate with the incident investigation team during any investigation of an incident meeting the investigation protocol.

4.11.4 Vehicle repairs shall be conducted at the authorization of the Manager / Supervisor.

4.12 Drug and Alcohol Testing

4.12.1 Testing for Alcohol and/or Drugs procedures shall be administered in accordance with the applicable policy and procedures. Refer to *S3AM-019-PR1 Substance Abuse Prevention.*

4.12.2 In the event that a police/regulatory officer responding to a vehicle incident administers field and/or laboratory impairment testing AECOM reserves the right, as permitted, to obtain copies of such testing results for inclusion in the incident report and consideration in a subsequent incident investigation.

4.13 Driving Privileges, Citations and Violations

4.13.1 A violation of this vehicle safety standard is subject review by the appropriate AECOM Human Resources representative and may be subject to disciplinary action, up to and including termination. The applicable Manager / Supervisor will review all incidents involving AECOM-owned, rented, or leased vehicles.

4.13.2 Citations and violations which occur while driving for AECOM business are to be reported as a vehicle incident in accordance with *S3AM-004-PR1 Incident Reporting, Notification & Investigation* within 24-hours. Incidents will be investigated as appropriate.

4.13.3 The AECOM Manager responsible for the employee, in consultation with the appropriate AECOM Human Resources representative, may suspend the privilege to operate vehicles on AECOM business due to noncompliance with the AECOM Vehicle and Driver Safety Program, involvement

in a motor vehicle incident, or resulting citations or other legal actions associated with motor vehicle violations.

4.13.4 The employee's driving privileges will be suspended for any of the following:

- Accidents or legal action involving alcohol or drug use (e.g., driving under the influence).
- Driving without a license.
- Hit-and-run driving or leaving the scene of an accident.
- Unauthorized use of AECOM vehicles (e.g., using an AECOM vehicle for moving personal items, carrying passengers who are not associated with work activities, etc.).

4.13.5 The employee's driving privileges may be suspended for any of the following:

- Two or more at-fault accidents involving the same Authorized Driver within a 12-month period.
- Multiple complaints from other employees or members of the public about driving performance.
- Any accident caused by an AECOM Authorized Driver where damages exceed $2,500.
- Failure to comply with the distracted driving requirements.
- Gross misconduct or violation of policy.

4.13.6 An Authorized Driver's driving privileges may be reinstated as follows:

- For any suspension resulting from law enforcement agency legal action involving drugs and alcohol on the part of the former Authorized Driver, driving privileges may be reinstated only by concurrent agreement of the Vice President of SH&E for the applicable Business Group and Human Resources Manager.
- For those Authorized Driver's privilege suspensions that are not related to driving under the influence of drugs or alcohol, privileges may be reinstated with concurrent agreement by the AECOM Manager, the SH&E Manager, and Human Resources Manager upon completion of required remedial training.

4.13.7 Disciplinary action may include the following:

- Loss of AECOM driving privileges.
- Disciplinary warning.
- Termination.

4.13.8 The employee is personally responsible for payment of fines for moving violations and parking citations incurred while driving a vehicle on AECOM business and for reporting such incidents to his/her Manager / Supervisor. The Manager is responsible for notifying Counsel.

4.13.9 If an Authorized Driver receives a citation resulting in the license being suspended from driving or has his/her driver's license revoked, he/she is required to notify his/her Manager / Supervisor prior to start of the following work day. Failure to do so may result in disciplinary action up to and including termination.

5.0 Records

5.1 Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

5.2 As applicable, completed *S3AM-005-FM2 Vehicle Inspection Checklists* and/or *S3AM-005-FM1 Journey Management Plans* shall be retained in project files.

6.0 Attachments

6.1 S3AM-005-ATT1 Authorized Driver Safety

6.2 S3AM-005-FM1 Journey Management Plan

6.3 S3AM-005-FM2 Vehicle Inspection Checklist

Americas

Authorized Driver Safety

S3AM-005-ATT1

1.0 Before Vehicle Operation

1.1 Learning and practicing good driving habits will help reduce the chance of a traffic collision. Learning to properly scan surroundings will improve hazard awareness and avoidance. With correct driving habits, errors can be significantly reduced and incident response time can be decreased.

1.2 All Authorized Drivers shall perform a walk-around inspection of the vehicle prior to operation.

1.2.1 Authorized Drivers should use the “Get Out And Look” (GOAL) method before placing a vehicle in motion. Drivers are to make a 360-degree (360°) walk around of the vehicle immediately before placing vehicle into motion in order to determine whether there are hazards or possible obstructions in the proposed path of travel. Drivers are to clear the area of people and objects before placing the vehicle in motion. A check will also be performed to confirm overhead and side clearances are adequate. The following are recommended best practices:

- Placement of cones on the right side of the front and rear of vehicle upon parking and retrieved during the 360° GOAL walk-around.
- In lieu of cones, place GOAL magnets on the right side of the hood and truck/tailgate of the vehicle upon parking. The GOAL magnets should then be retrieved during the 360° GOAL walk around just prior to moving the vehicle again.
- Place a GOAL sticker on the driver side door window as a reminder to get out and look.

1.2.2 Pre-operation vehicle inspections shall be performed and documented by all Authorized Professional Drivers and all Authorized Hired Drivers. A sample vehicle inspection checklist is provided in *S3AM-005-FM2 Vehicle Inspection Checklist*.

1.3 Drivers shall be familiar with applicable client rules and regulations when on the client’s sites. The employee may, for example, be required to leave their keys in the ignition with the vehicle turned off or to display a vehicle pass. When parking, it is recommended that employees back the vehicle into the parking space.

1.4 Drivers must be trained, competent and in possession of a current driver’s license that is valid to the jurisdiction and the vehicle driven. Any additional certification required given the particular vehicle and equipment transported must also be current (e.g. air brake certificate).

1.5 Execute proper travel planning to avoid being in a rush, traveling during peak traffic hours, and traveling through high traffic volume areas. Utilize the *S3AM-005-FM1 Journey Management Plan* as appropriate.

1.6 All drivers must be involved in a task hazard assessment applicable to the task(s) undertaken (may exclusively be the driving task or may include the driving task).

1.7 Confirm current insurance and registration is maintained with the vehicle and any equipment being towed. License plates must be clean.

1.8 As applicable, check all safety equipment (e.g. First Aid Kit, Fire Extinguisher, Flares, Triangles, Reflective Vest, etc.).

1.9 As applicable, check for survival gear and equipment. Emergency kits should include blankets, food, water, flashlight, extra batteries, a method of communication and a heat source such as a candle.

1.10 When accessing any pickup truck box, staff will: step up into the box to avoid excess reaching and strain and; use three point contact getting in and out of the truck box (i.e., avoid jumping off the tailgate).

1.11 Confirm no items are hanging from the rear view mirror that could obstruct vision.

1.12 Adjust mirrors to confirm optimal visibility.

2.0 Vehicle Operation – General

2.1 Be vigilant of differences between trucks and small cars related to blind spots, turning radius, and required overhead and undercarriage clearances.

2.2 It is a personal responsibility of the driver to operate a vehicle safely and in compliance with regulations (e.g. Cargo Securement, Traffic, Dangerous Goods, etc.).

2.3 Confirm compliance with applicable traffic legislation, driver regulations, and rules (e.g. commercial driver hours of service, state / provincial highway acts, municipal bylaws, private road/property owner rules, site specific rules, etc.).

2.4 All vehicle occupants shall wear seatbelts at all times.

2.5 Keep reflectors, lights and windows (inside and out) clean.

2.6 Window cleaner should be on hand for cleaning the interior of the windows as well as headlights that have become obscured due to road spray or slush.

2.7 A shovel and a supply of sand or gravel can help to extract a stuck vehicle that does not have traction.

2.8 Maintain good housekeeping practices and confirm items and loaded materials are secured from movement on both the interior (e.g. cab, glove box, etc.) and exterior (e.g. box, flat deck, etc.) of the vehicle.

2.9 Conduct en-route inspections as required to check cargo securement.

2.10 Pulling Over

2.10.1 Pull the vehicle off the road to a safe location as required by the applicable jurisdiction (e.g. rest stops, a side road, an unused approach):

- If, in the ongoing assessment of road and weather conditions, it has been concluded that travel is no longer safe (i.e. heavy rain, sleet), and wait until conditions allow for safe travel.
- To review or adjust navigation equipment and check cargo securement.
- To check telephone messages, text messages or to take notes.
- For interval breaks, to stretch and if fatigued (try to take a break every two hours).
- To manage and eliminate driver distractions.

2.10.2 If it is necessary to park a vehicle on the shoulder of an active roadway, park as far off the road as possible, and turn on the four-way indicators (hazard lights) prior to leaving the vehicle. Use cones or other warning devices, and wear a high visibility traffic vest.

2.10.3 Observe extra caution in and around emergency and construction zones.

2.10.4 Avoid unattended rest areas, when possible, and especially at night.

2.10.5 If the vehicle breaks down, attempt to get to a secured location. Call police or roadside assistance as appropriate.

2.10.6 Contact the police to help those with car trouble instead of stopping to assist.

2.10.7 When possible, employees should have a car mechanic or roadside assistance change or repair a flat tire. If the Driver or passenger must change a tire, the Driver and passenger must adhere to the manufacturer's specifications and observe the proper lifting technique and safety procedures. Proper lifting is addressed in *S3AM-104-PR1 Manual Material Handling*.

2.10.8 When parking or leaving a vehicle, the following procedures must be followed:

- Engage the transmission in park (automatic transmission) or first gear (standard transmission).
- Shut off the engine.

- Set the parking brake.
- Remove the ignition keys, and lock the vehicle.

2.10.9 If work (e.g., surveying) is required alongside an active road, park the vehicle behind the area of work to provide a barrier against out-of-control vehicles.

2.11 Backing Up

2.11.1 Keep reverse motion to a minimum as the most common incidents involve backing up.

2.11.2 Whenever possible, vehicles should be parked in a manner that prevents the driver from backing (reversing) upon departure. For example, the vehicle should be backed into a parking spot or drivers should select a parking spot that allows them to “pull” through” so that the vehicle is facing the direction of departure.

2.11.3 Confirm the area behind the vehicle is clear prior to and while reversing a vehicle.

2.11.4 All vehicles with limited visibility operated around workers or on a construction site:

- Should have an audible back-up alarm installed that functions automatically when the vehicle is put into rear motion; or
- Shall be backed up only when a signaler communicates that it is safe to do so.
- If a vehicle is not equipped with an audible back-up alarm, the operator shall sound the vehicle horn twice to indicate intention to back vehicle up.

2.11.5 Confirm compliance with applicable traffic legislation regarding backing up (i.e. Texas – An operator may not back the vehicle on a shoulder or roadway of a limited-access or controlled-access highway; Ontario – No driver of a vehicle shall back the vehicle upon the roadway or shoulder of any highway divided by a median strip on which the speed limit is in excess of 80 km/h; etc.).

2.11.6 Take the time to become acquainted with the area the vehicle is to be backed into.

2.11.7 Inspect the area to be backed into (i.e. walk around it by foot, identify obstructions and possible hazards).

2.11.8 Line up as straight as possible with intended final position prior to backing equipment or vehicle up.

2.11.9 If the area is congested with people or equipment a signaler SHALL be used.

2.11.10 Before putting the vehicle into motion, decide:

- The method of communication (hand signals, two-way radios or other means).
- If hand signals are going to be used, confirm both the driver and signaler agree on signals to be used.
- If two-way radios are being used confirm there is continuous voice contact between the signaler and driver. If there is nothing being transmitted on the two-way radio the driver shall STOP the vehicle.

2.11.11 While backing up:

- Confirm there is constant visual contact with the signaler when the vehicle is in motion if using hand signals.
- If driver loses eye contact with the signaler at ANY time, the driver shall STOP the vehicle until eye contact is regained. The exception is where the communication between the signaler and driver is conducted by two-way radio.
- When possible, the signaler shall stand on the driver’s side of the vehicle during motion.

- The signaler must always keep a safe distance from the vehicle or equipment and never stand directly in the path of motion. Refer to Safe Work Practice – Red Zone.
- While backing up using a signaler, the driver must confirm that the vehicle radio (not to be confused with two-way radio) is off and the windows are down (if possible) to avoid distraction and to be able to hear outside of the vehicle.
- If the driver notices anything out of the ordinary (despite what the signaler is directing) the driver will STOP the vehicle or equipment and assess the situation.
- If at any time the safety of any person or property is at risk, including that of the signaler, the signaler shall signal the driver to STOP the vehicle IMMEDIATELY.
- Any person (other than the signaler) can direct the driver to STOP the vehicle or equipment and the driver must take that as a valid direction to STOP.

3.0 If Vehicle is to be Left Unattended

3.1 Turn the ignition off, remove the key and set the emergency brake (if parked on an incline).

3.2 Lock and secure the vehicle.

3.3 Secure equipment and property in a locked trunk or tool chest.

3.4 Do not leave keys in an unattended vehicle.

4.0 Defensive Driving

4.1 Demonstrate an effective and positive driving attitude.

4.2 Use road courtesy, expect the unexpected and be patient. Do not rush or drive aggressively.

4.3 Follow and obey regulations.

4.4 Do not make sudden lane changes and always use signal lights.

4.5 Be Visible – Be seen by all other drivers, pedestrians, cyclists and others using or crossing the road:

4.5.1 Avoid driving in blind spots of other vehicles.

4.5.2 Confirm vehicle lights are on, working and clean before and during travel.

4.5.3 Confirm the vehicle's horn works and use it as necessary to warn others.

4.5.4 Tapping the vehicle brakes may provide a visible alert for following vehicles.

4.5.5 Confirm adequate distance to enable passing of other motorists safely.

4.6 If it is necessary to turn a vehicle around, confirm that the operation is conducted safely and according the applicable traffic legislation and rules.

4.7 Always operate a vehicle within operator driving limitations. Do not be enticed by others to exceed driving capability for any reason. When behind the wheel, drivers must be in control of all driving related situations.

4.8 Maintain awareness of all objects in the immediate circle of influence. Whenever possible, stay well clear of other vehicles, machinery, equipment and pedestrians.

4.9 Scan Ahead – Check the path of travel for obstacles and other vehicles:

4.9.1 Utilize three driving monitoring zones (should not be confused with safe following distances):

- Action Zone (approximately 4 to 6 seconds in front of the vehicle) – activity in this zone generally requires immediate reaction by the driver.

- Planning Zone (at least 15 seconds in front of the vehicle) – look ahead to visually identify if there is slowing traffic or another type of road hazard ahead or to the side. Do not drive behind vehicles that block visibility.
- These zones may require enlarging based on speed and driving environment (e.g. traffic congestion, weather, etc.).

4.9.2 Get the big picture and look for hazards (other motorists, pedestrians, cyclists, road debris, etc.).

4.9.3 Moving eyes every 2 seconds can help to avoid fixating on any one object. Check rear view mirror every 5 to 8 seconds and any time braking.

4.9.4 Read and obey traffic signage and controls.

4.9.5 Use high beam head lights when possible.

- Use low bean headlights when following closely behind other vehicles or when approaching and meeting oncoming traffic.
- Use low beam headlights in fog or heavy snow.

4.9.6 Wear appropriately tinted sunglasses to improve visibility in sunny conditions. Do not wear sunglasses at night and, if wearing at dusk or dawn, confirm the tint is of the type that improves and does not hinder visibility.

4.10 Keep a Space Cushion:

4.10.1 Maintain a space cushion around the vehicle to improve the potential of avoiding a collision. Create an out by monitoring the space in front, behind and to each side of the vehicle, leaving enough area as a cushion to enable evasive action if needed.

4.10.2 Maintain a minimum of 2 seconds plus 1 second for every 10 feet (3m) of vehicle length between the vehicle driven and the vehicle ahead:

- Pick a marker on the road ahead, such as a road sign or pole.
- Count "one thousand one, one thousand two".
- When the front of the driven vehicle reaches the marker, stop counting.
- If the marker is reached before "one thousand two," increase the space cushion.
- Add more time (space) in poor driving conditions.
- Add more time (space) if the vehicle operated is heavily loaded.
- Add more time (space) if the vehicle ahead is smaller and lighter and may stop more quickly than the vehicle operated.

4.10.3 When stopped behind another vehicle leave 1 vehicle length between the vehicle driven and the vehicle ahead.

4.10.4 Do not travel in a traffic cluster. Manage the space to the front, left and right of the vehicle driven.

4.10.5 Fog, heavy rain, snow, slush or wind require speed and distance between vehicles to be adjusted accordingly.

4.11 Recognize and Anticipate Hazards:

4.11.1 Exercise increased caution at night, dawn and dusk.

4.11.2 When driving at night look to the right of the on-coming headlights and not directly head-on.

4.11.3 Identify changing road hazards or conditions.

4.11.4 Identify changing weather or driving conditions:

4.11.5 Light rain and heat can draw oil to the surface of asphalt creating slippery driving conditions.

4.11.6 Heavily rain soaked roads can result in a vehicle hydroplaning / aquaplaning.

4.11.7 Fluctuating cold temperatures may produce ice.

- Open hilltops may become icy due to blowing snow accumulating and freezing on the road.
- Shaded areas, such as overpasses and bridges, will freeze first and dry out last. These locations are prone to black ice.
- Be aware that black ice may be very difficult to spot. Darker, glossy spots may indicate black ice.

4.11.8 At dawn or dusk, the low sun can create a significant visibility hazard.

4.11.9 Be aware of changing conditions (i.e. traffic patterns, accidents, traffic lights, other vehicles).

4.11.10 Watch for large loads or slow moving agricultural equipment:

- Exercise extreme caution, provide extra room and pass only if it is safe to do so.
- Be aware that large loads or heavy equipment cannot stop as quickly as smaller vehicles and require a longer stopping distance.
- Never pull directly in front of these vehicles after passing or merging, but leave adequate space to confirm safe operation.
- Signal well in advance of any intended maneuver to give large vehicles additional time to react.

4.11.11 Avoid travelling in the blind spots of other vehicles or mobile equipment.

4.11.12 Scan road and shoulders for wildlife and pedestrians:

- Animals may travel in groups. Maintain heightened awareness when spotting one.
- Leave plenty of room when driving around an animal on or near the road – a frightened animal may run in any direction.
- Honk in a series of short bursts to make animals move out of the way.
- Avoid *swerving* for wildlife as this could result in veering into oncoming traffic.

4.12 Reduce Speed:

4.12.1 Adjust speed to accommodate traffic flow and patterns.

4.12.2 Adjust speed to all weather pattern changes (Rain/Hydroplaning, Ice & Frost/Traction Loss, and Restricted Visibility).

4.12.3 Adjust speed in response to inconsistent road surfaces.

4.12.4 Reduce speed when required by law, in construction zones and school and playgrounds.

4.12.5 Safely and appropriately reduce speed upon observing any hazard to increase reaction time.

4.12.6 Always be prepared to brake at an intersection.

4.12.7 Always come to a full stop at uncontrolled railway intersections and verify it is safe to proceed.

4.12.8 Make eye contact with other motorists at intersections (particularly uncontrolled intersections) before proceeding.

4.12.9 Never assume other motorists are following and obeying road rules.

4.12.10 Keep to the right of the road or in the right-hand lane on multi-lane roads unless turning left or passing another vehicle.

4.12.11 Confirm driving practice and vehicle position allow for a defensive or avoidance maneuver.

4.13 Eliminate Distractions

4.13.1 Confirm appropriate time is taken to become acquainted with an unfamiliar vehicle prior to driving.

4.13.2 Do not operate a vehicle if preoccupied, agitated or have existing health issues that could potentially pose a safety issue.

4.13.3 Do not operate a vehicle if under any form of impairment (i.e. fatigue, alcohol, drugs, etc.).

4.13.4 Remain engaged. Do not succumb to boredom, complacency, or allow the focus to drift from the driving task.

4.13.5 Remain focused on driving defensively and follow any given direction when passing an accident scene.

4.13.6 Avoid any activity that requires moving a hand from the steering wheel (e.g. changing radio stations, handing articles to passengers, etc.).

4.13.7 Do not engage in activities that may distract from the driving task (e.g. operating navigation systems, ridding the cab of an insect, etc.).

4.13.8 Do not engage in eating or drinking that may distract from the driving task.

4.13.9 The use of electronic devices that may distract the driver while driving is prohibited. This includes cell phones, two-way radios and other items whether hand-held or hands-free (a simple text message sent while travelling at highway speed results in an operator's eyes being off the road for the length of a football field).

5.0 Road Rage

5.1 Road rage is a dangerous driving situation that can occur and should be avoided whenever possible, but NEVER instigated. Do not get drawn into a confrontation. Avoid any confrontational eye contact or gestures.

5.2 The driver should be aware of the vehicles around them, paying frequent attention to the vehicle's mirrors.

5.3 Get out of the way if safely possible, even if the other motorist is speeding. The other driver may be dealing with an emergency situation.

5.4 Unless it is necessary to use the horn as an alert, do so sparingly.

5.5 If followed after an on-the-road encounter, drive to a public place or to the nearest police station and seek assistance.

5.6 Attempt to note the offender's license plate number and write it down as soon as it is safe to do so and the vehicle is not in motion.

5.7 Report any aggressive driving to the police immediately. This action may aid in preventing further occurrences by the same driver.

6.0 Winter Driving

6.1 Clear snow from exterior vehicle surfaces.

6.2 Do not cruise control on icy roads.

6.3 Accelerate and brake gently to reduce skids or spinouts.

6.4 Wear winter clothing that does not restrict movement, vision or hearing.

6.5 Where required, have snow chains for the vehicle and be familiar with their installation.

6.6 Use extra caution while driving during hazardous winter conditions.

6.7 Avoid sudden changes of speed or direction to reduce possibility of skidding.

6.8 Drivers should leave extra distance between their vehicle and the vehicle ahead of them. Stopping on ice takes approximately eight times the distance that it takes on dry pavement.

6.9 Carry suitable warm clothing and emergency equipment during the winter months. Temperatures can plunge rapidly.

6.10 Be aware of icy patches on the road bridges and intersections that are especially prone to icing.

6.11 Be familiar with the skid control procedures for the type of vehicle being driven (e.g., front, rear or four-wheel drive).

7.0 Gravel Roads and Remote Locations

7.1 Prior to driving on a road with an assigned radio frequency, the passenger will test the two-way radio to confirm that the proper radio frequency is set, and that the transmission is being received clearly by other traffic. The passenger will operate the two-way radio.

7.2 Drivers will maintain appropriate speed for the road conditions.

7.3 Headlights will be used when operating the vehicle.

7.4 Drivers will respect the understood road protocol, drive defensively and respect intersections.

7.5 4WD options will be utilized at the discretion and comfort level of the driver. If road conditions are questionable even for 4WD use, the road will not be traveled and either another route found or the job postponed until road conditions improve.

8.0 Off-road

8.1 If inexperienced, seek supervisory advice and training.

8.2 Vehicles should only be driven off roads after other available options (e.g., use of ATV's, etc.) have been considered.

8.3 Prior to driving off-road, check to see that the vehicle is in good operating condition and tires are properly inflated.

8.4 Realize the limitations of the vehicle and do not become over confident.

8.5 Seat belts should be kept fastened and loose objects in the vehicle securely fastened to prevent them from becoming projectiles in the event of a sudden stop.

8.6 Drive according to the ground conditions.

8.7 Speed and power are normally not required in rough off-road driving.

8.8 Learn to read the surrounding terrain. Monitor the ground conditions ahead of the vehicle -- it is essential to know what to expect in light of the road conditions.

8.9 When slowly traversing difficult areas of soft ground, try to keep the vehicle in motion.

8.9.1 Once stopped it is far more difficult to get the vehicle going again.

8.9.2 If the vehicle becomes stuck, do not spin the wheels, as they will only dig in further or deeper until the vehicle chassis rests on the ground.

8.9.3 Try to slowly back the vehicle in its own tracks, as these have been previously compressed by the vehicle. In most cases this will be successful. If not, place appropriate material (e.g., wooden planks, mats, branches, etc.) under the wheel to improve traction.

8.10 Before driving over rough terrain, the terrain should be inspected on foot first.

8.11 When climbing hills in the vehicle travel straight up or down.

8.11.1 Be aware of what is on the other side of the hill prior to climbing.

8.11.2 At the base of the hill the driver should apply more power. Ease up on the power while approaching the top and before going over the crest.

8.11.3 If the vehicle stalls on the ascent, back straight down the hill in reverse.

8.11.4 For downhill travel in a vehicle with manual transmission, always use the lowest appropriate gear, and do not disengage the clutch to allow the vehicle to coast. If the vehicle is equipped with an automatic transmission, use low range and the lowest drive setting.

8.11.5 DO NOT drive a hill at an angle this increases the risk for a roll-over incident.

8.11.6 DO NOT attempt to climb a very steep hill if there is doubt the vehicle can successfully climb the hill.

8.12 When driving through water, consider the maximum wading depth of the vehicle.

8.12.1 The air intake must always be kept clear of water.

8.12.2 Driving through water should always be done slowly to keep the bow wave low.

8.12.3 In addition, slow speed prevents a hot engine from suffering tension cracks by sudden contact with cold water.

8.12.4 Check the brakes after leaving the water.

8.13 Prior to returning to the road, do a vehicle inspection to confirm the vehicle is road worthy.

9.0 Towing

9.1 Conduct a pre-start inspection of the equipment to be towed.

9.2 Only hook-up equipment, using a signaler to do so, that has been verified as safe for transport.

9.3 Confirm the hitching equipment of the vehicle and that of the equipment to be towed are compatible.

9.4 Always inspect the hitch for defects and to confirm it is securely closed (e.g. safety pin in place, safety chains hooked up using the “crossed” or “cradle” method, locking devices on hooks).

9.5 Confirm light cord is plugged in and any emergency braking devices are hooked up. Verify all lights are in working order.

9.6 Conduct a brake test prior to travelling.

9.7 Confirm speed of travel does not exceed the manufacturer’s specification for the equipment towed.

9.8 Maintain awareness of total dimensions of the vehicle plus the equipment towed. Adjust driving accordingly (i.e. widen turning radius, increase distance between vehicles).

Americas

Journey Management Plan

S3AM-005-FM1

Project:	**Journey Management Plan Identifier # (optional):**
Project Specific Requirements:	
Journey Management Plan – Minimum – required for trips > 250 miles / 400 kilometers (one way) and as identified in the project specific requirements.	
1. Driver and Passenger Information	
Driver Name:	Driver Training Completed:
Passengers:	
2. Vehicle Information	
Company Owned ☐ / Rental / Leased ☐ / Personal ☐	
Vehicle Type/Description/Registration No.:	
3. Trip Information	
What is the purpose of the trip?	Estimated distance:
Single Trip: ☐ Reoccurring Trip: ☐ / / to / /	
This Journey Management Plan is to be assessed and reviewed prior to each trip.	
Have alternate modes of travel (telepresence, public transportation, air, train) been evaluated? ☐ Yes ☐ No	
Has a Safe Work Plan or Task Hazard Assessment been completed and attached? ☐ Yes ☐ No ☐ NA	
Destination 1:	
Departure Date: / Time: / Arrival Date: / Time (ETA):	
Destination 2:	
Departure Date: / Time: / Arrival Date: / Time (ETA):	
Destination 3:	
Departure Date: / Time: / Arrival Date: / Time (ETA):	
Destination 4:	
Departure Date: / Time: / Arrival Date: / Time (ETA):	
4. Special Conditions / Hazards (Check all that may apply)	
☐ Night Driving ☐ Weather ☐ Road Conditions (e.g., construction, ice, snow) ☐ Rush Hour/Heavy Traffic ☐ Long Driving / Fatigue (Over 2 hours) ☐ Potential for distraction	☐ Rugged Terrain (4 x 4 ☐ Large Vehicles ☐ Animals ☐ Towing (e.g., trailer) Other
Additional Conditions / Hazards Details:	
Weather forecast:	
5. Contact Information	
Traveler No. 1 (Driver) - Name:	Phone No:
Traveler No. 1 (Driver) - Personal Contact Name:	Phone No:
Traveler No. 2 - Name:	Phone No:
Traveler No. 2 - Personal Contact Name:	Phone No:

Traveler No. 3 - Name:		Phone No:
Traveler No. 3 - Personal Contact Name:		Phone No:
Manager - Name:		Phone No:
Check-In Contact - Name:		Phone No:
Alternate Check-In Contact - Name:		Phone No:
Destination Contact (if applicable) - Name:		Phone No:
Other (description)	Name:	Phone No:
Other (description)	Name:	Phone No:

6. Route of Travel

Route of travel (insert map or give detailed route directions):

Is the return route of travel the same? ☐ Yes ☐ No

7. Check-In Procedure

- Check-In Interval -
- Advise Manager and any other applicable personnel of travel plans and supply with a copy of this form (including attachments)
- Confirm availability of Manager or Check-In Contact. Confirm check-in interval with Manager or Check-In Contact.
- Discuss with contacts the possibility of travel within a cell phone "dead zone".
- Advise Manager or Check-In Contact of departure.
- Call Manager or Check-In Contact upon arrival at destination (e.g. worksite, office, home).
- If multiple destinations, the process is repeated.

7.A Missed Check-In Procedure for Manager

- Attempt to call traveler(s) using contact number(s) listed above.
- Contact traveler's personal contact listed above.
- If unsuccessful, discuss options with Manager, Check-In Contact (is anyone nearby who can be sent out along the route to destination, how much daylight remains, etc.?).
- Call 911 or local police.

8. Emergency Planning

AECOM Supervisor	Name:	Phone Number:
AECOM Manager	Name:	Phone Number:
Roadside Service:		
Emergency: 911 or equivalent	Incident Reporting:	

9. Approvals: All Journey Management Plans shall be reviewed and acknowledged by the driver and the driver's manager / supervisor. Copies of the form shall remain with the driver and the manager / supervisor for the duration of the journey. (Electronic copies are acceptable).

Driver's Signature:

Manager or Supervisor	Name:	Signature:

AECOM

Americas

Vehicle Inspection Checklist

S3AM-005-FM2

Instruction

1. **This Vehicle Inspection Checklist is intended to be completed by the vehicle driver prior to departing on a trip.**
2. **Checking boxes means that item is present and functioning. Deficiencies affecting or could potentially affect the safe operation of the vehicle shall be repaired or corrected prior to departure.**
3. **This checklist should only be used in addition to an on-going vehicle maintenance program.**
4. **This checklist is to be completed and retained in accordance with Driving – Americas S3AM-005-PR1.**
5. **All documentation must be maintained in the appropriate files (project, program, office, etc.).**

Vehicle Tag No:	Mileage:	Date:	Time:	Driver Name:	Location:

	Item	Yes	No	N/A
1.	**General**			
a.	Proof of insurance and registration available and current?	☐	☐	☐
b.	Is the date of the last regular maintenance known, or is the mileage/date of next scheduled maintenance known?	☐	☐	☐
c.	Is the overall condition of the vehicle good (no body damage, unusual sounds, leaks, odors, etc.)?	☐	☐	☐
2.	**Tires**			
a.	Do all tires have sufficient tread for driving conditions? Legal limit: 2/32” (for rain/snow: > 4/32”)	☐	☐	☐
b.	Are tires sufficiently inflated for driving conditions?	☐	☐	☐
c.	Are the lug nuts and stem caps present and tight for each tire?	☐	☐	☐
d.	Is the spare tire and jack present and in good condition?	☐	☐	☐
3.	**Vehicle Interior**			
a.	Are the brake and accelerator pedal pads in good condition?	☐	☐	☐
b.	Are the floor mats in good condition and not interfering with the brake or accelerator pedals?	☐	☐	☐
c.	Is the seat properly adjusted (including the headrest)?	☐	☐	☐
d.	Is the seatbelt in good condition?	☐	☐	☐
e.	Are the mirrors in good condition (not broken, dirty)?	☐	☐	☐
f.	Are the dashboard/instrument lights working?	☐	☐	☐
g.	Is the dashboard free of warning lights and do the gauges appear to work when the car is started?	☐	☐	☐
h.	Does the horn work?	☐	☐	☐
i.	Are distractions such as cell phones and GPS units secured so they do not encourage use?	☐	☐	☐
4.	**Lights and Signals**			
a.	Do the headlights and high beams work?	☐	☐	☐
b.	Do the tail lights function properly?	☐	☐	☐
c.	Do the turn signals work (front and rear)?	☐	☐	☐
d.	Do the brake lights work (including high light in the rear window if applicable)?	☐	☐	☐
e.	Do the hazard lights (emergency flashers) work?	☐	☐	☐

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	Item	Yes	No	N/A
f.	Do back up / reverse lights work?	☐	☐	☐
g.	If equipped with a back-up alarm, can it be heard clearly?	☐	☐	☐
5.	**Mechanical**			
a.	Do the brakes work and feel solid (not soft)?	☐	☐	☐
b.	Does the parking/emergency brake work?	☐	☐	☐
c.	Is the steering in good working condition (not loose)?	☐	☐	☐
d.	Is the engine oil level full or in the operating zone?	☐	☐	☐
e.	Excessive vehicle bounce going over bumps reported (possible sign of worn shock absorbers)?	☐	☐	☐
f.	Is the fuel level full or at an adequate level for the proposed usage?	☐	☐	☐
6.	**Windows and Windshield**			
a.	Is the windshield clean and unbroken?	☐	☐	☐
b.	Are the wiper blades in good condition (front and rear)?	☐	☐	☐
c.	Are all the windows clean and unbroken and windshield fluid available and operational?	☐	☐	☐
7.	**Emergency Equipment (as needed per conditions/project requirements)**			
a.	Is there a “Safety Kit” (fire extinguisher, first aid, safety triangle and 2 reflective vests)?	☐	☐	☐
b.	Is there a first aid kit, has it been inspected recently?	☐	☐	☐
c.	Is survival gear and equipment available (blanket, water, heat source, flashlight, etc.)?	☐	☐	☐
d.	Is a means for emergency communication available?	☐	☐	☐
8.	**Other Equipment (as needed per conditions/project requirements)**			
a.	Is there a means to secured loads (cargo next, container)?	☐	☐	☐
b.	Are cones or other warning devices available?	☐	☐	☐
c.	Is weather specific equipment (snow chains, tired etc.)?	☐	☐	☐
d.	Does the vehicle have a snow brush/ice scraper?	☐	☐	☐
e.	Does the vehicle have a fire extinguisher?	☐	☐	☐
9.	**Comments**			

Inspector Name	**Signature**	**Date**

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Americas

Flammable & Combustible Liquids

S3AM-126-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.2 The purpose of this procedure is to provide information regarding the proper storage, handling, and work practices associated with flammable and combustible liquids.

2.0 Terms and Definitions

2.1 **Flashpoint** – The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. The flash point is normally an indication of susceptibility to ignition.

2.2 **Safety can** – Safety can: an approved container, of not more than 5 gallons (18.9 liters) capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure

3.0 References

3.1 S3AM-011-PR1 Fire Protection

3.2 S3AM-115-PR1 Hazardous Material Communication

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Implementation of this standard is the responsibility of the AECOM manager directing activities of the facility, site, or project location.

4.2 Appoint a Responsible Person who will:

4.2.1 Determine if flammable or combustible liquids are stored on-site. Flammable liquids and combustible liquids are classified or categorized differently by jurisdiction. As a general definition that aligns the different classifications or categories, flammable and combustible liquids are any liquid that has a flashpoint at or below 199.4°F (93°C). Refer to *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications.*

4.2.2 Inspect storage areas monthly.

4.2.3 Monitor the quantity of flammable and combustible liquids on the site.

4.2.4 Review work practices involving flammable and combustible liquids.

4.2.5 Safety data sheets (SDS) for all hazardous substances, including flammable and combustible liquids, must be provided by vendors or subcontractors, and maintained on site. For more information, see *S3AM-115-PR1 Hazardous Material Communication*.

4.2.6 Furnish portable fire extinguishers in such quantities, sizes, and types as needed for the special hazards of operation and storage. For more information, see *S3AM-011-PR1 Fire Protection*.

4.3 Control flammable and combustible liquids entering the site by ordering only those materials and quantities needed to complete a job.

4.4 Cylinders – General Use & Transport

4.4.1 Open and close cylinder valves using the appropriate tools provided by the cylinder supplier.

4.4.2 Remove regulators and replace caps before transporting cylinders.

4.4.3 Do not roll or drop cylinders. Transport cylinders in a vertical and secured positing using a cylinder basket, cylinder cart or other secure equipment.

4.4.4 Do not use cylinders if the cap cannot be removed by hand. Do not use tools (e.g., hammer) to loosen caps. Tag the cylinder "Do Not Use" and return the cylinder to a designated storage area to be returned to the cylinder supplier.

4.5 General Storage

4.5.1 Use only approved containers, tanks, and pumping equipment for storage and handling of flammable and combustible liquids. Use approved (UL or FM) metal safety cans (with spring-closing lid and spout cover, and optional flash-arresting screen) for the handling and use of flammable liquids in 1- to 5-gallon (3.8- to 18.9-liter) quantities. For additional information, see *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications.*

4.5.2 Place all rags, waste, etc., soiled by combustible or flammable materials in tightly closed metal containers for daily disposal.

4.5.3 Take precautions, including proper ventilation, to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to: open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition; chemical reactions; and radiant heat.

4.5.4 Require approved personal protective equipment for all persons handling flammable or combustible liquids, as outlined by the appropriate SDS.

4.5.5 Train employees exposed to flammable or combustible liquids in the hazards of these materials; in their safe handling, use and disposal; in their protection from ignition sources; in the type, use, and placement of containers and cabinets; in the location of fire extinguishers; in the protection against toxic vapors; and in the procedures to follow in case of spill or fire.

4.6 Indoor Storage

4.6.1 Keep indoor storage of flammable liquids to a minimum. Do not store more than 25 gallons (95 liters) of flammable or combustible liquids outside of an approved storage cabinet.

4.6.2 Do not store flammable or combustible liquids in areas used for exits, stairways, or normally used for the safe passage of people.

4.6.3 Do not store more than of flammable and combustible liquids in a single flammable storage cabinet in excess of that specified by the applicable jurisdiction. Refer to *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications*.

4.6.4 Do not store oxidizers and other reactive chemicals in flammable cabinets.

4.6.5 Up to three cabinets may be grouped together. Groups of cabinets must be separated by at least 100 feet (30.5 meters).

4.6.6 Conspicuously label all cabinets "Flammable — Keep Fire Away."

4.6.7 Indoor flammable liquid storage rooms must conform to NFPA codes, including requirements regarding fire ratings, spill containment, maximum capacity, electrical classifications, and ventilation requirements.

4.7 Outside Storage

4.7.1 Maintain a minimum of 20 feet (6.1 meters) between flammable and combustible storage areas and any building.

4.7.2 Maintain a minimum distance of 50 feet (15.2 meters) between flammable and combustible storage areas and hot work activities. Refer to *S3AM-332-PR1 Hot Work*.

4.7.3 Grade the storage area in a manner to divert possible spills away from buildings, and curb or dike so as to contain entire volume of liquids and prevent spills from impacting soil or groundwater.

4.7.4 Keep the entire storage site free from accumulation of unnecessary combustible materials. Closely cut weeds and grass, and establish a regularly scheduled cleanup procedure for the whole area.

4.7.5 Maintain adequate access-ways to open-yard storage to allow access by fire-fighting equipment. Equipment that is blocking access must be manned at all times so that it may be readily moved if necessary.

4.8 Labeling and Signage

4.8.1 Post a "NO SMOKING OR OPEN FLAME" sign in all areas where flammable and combustible materials are stored, handled, and processed.

4.8.2 Require all containers and cylinders to be labeled with the contents and adequate hazard warnings per *S3AM-115-PR1 Hazardous Materials Communication.*

4.9 Use of Materials on Site

4.9.1 Use flammable and combustible liquids in a manner that is consistent with the label and SDS for the product.

4.9.2 Use only those amounts of materials needed for the job. Transfer of these materials to ready-to-use containers is encouraged.

4.9.3 Use personal protective equipment stated on the product label and SDS. For additional information, consult *S3AM-208-PR1 Personal Protective Equipment*.

4.9.4 For dispensing and/or fueling operations, ensure:

- Signs are posted with instructions on the dispensing or fueling process.
- Operators have been trained in the dispensing or fueling process.
- Equipment being refueled has the engine shut off prior to fueling.
- Smoking is prohibited in vehicle and equipment refueling areas.
- Adequate protection is provided to safeguard dispensing pumps from physical damage from vehicles.
- Dispensing nozzles have auto shut-off or self-closing valves and provisions for containing or controlling over-spillage.
- Heating equipment installed in lubrication or service areas, where flammable liquids are dispensed, is of an approved type, and where feasible, is installed at least 8 feet (2.4 meters) above the floor.
- Tank cars and trucks being loaded or unloaded and flammable storage tanks and systems are properly bonded and grounded.
- Transfer of flammable liquids from one container to another is done only when containers are electrically interconnected (bonded).
- Proper PPE is required during the dispensing or fueling process. For additional information, see *S3AM-208-PR1 Personal Protective Equipment*; and *S3AM-126-FM1 Flammable and Combustibles Inspection.*

4.10 Spill Control

4.10.1 Have a written spill response plan in place before materials are stored or used on site.

4.10.2 Have spill clean-up materials in the vicinity of the materials being stored.

4.10.3 Clean up or respond to spills promptly according to applicable local, state, and federal regulations. This may require notification of authorities if a Reportable Quantity (RQ) is exceeded.

4.10.4 Move leaking cylinder to a ventilated area away from ignition sources. Do not attempt to repair a leaking cylinder. Contact the cylinder supplier to determine proper response methods.

4.11 Disposal

4.11.1 Keep solvent waste and flammable liquids in fire-resistant, covered containers until they are removed from the worksite.

4.11.2 Do not place flammable or combustible waste in municipal garbage.

4.11.3 Do not pour flammable or combustible liquids down drains or onto the ground.

4.11.4 Dispose of flammable or combustible hazardous materials with a licensed and approved hazardous material disposal company.

4.12 Inspection

4.12.1 Inspect flammable and combustible storage and use areas on a monthly basis.

4.12.2 Use *S3AM-126-FM1 Flammable & Combustibles Inspection* or equivalent to inspect the storage areas.

4.12.3 Inspect cylinder regulators, gauges, valves, hoses and connections before use. Any damaged equipment shall be tagged out-of-service.

4.13 Training

4.13.1 Require that hazard communication training includes specific hazard information for the flammables and combustibles used.

4.14 Compliance

4.14.1 Review and comply with country and client/customer-specific requirements.

5.0 Records

5.1 The following information will be maintained in the project file.

5.1.1 Location of the SDS inventory.

5.1.2 Completed *S3AM-126-FM1 Flammable & Combustibles Inspection* or equivalent.

6.0 Attachments

6.1 S3AM-126-ATT1 Flammable & Combustible Liquid Classifications

6.2 S3AM-126-FM1 Flammable & Combustibles Inspection

Americas

Hand & Power Tools

S3AM-305-PR1

1.0 Purpose and Scope

1.1 This procedure provides the AECOM requirements for all manually operated hand and power tools and associated use, handling and storage. These requirements apply to tools provided by AECOM for employee use as well as tools provided by employees for use on AECOM work sites.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-302-PR1 Electrical Safety

3.5 S3AM-325-PR1 Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers/Supervisors**

- Ensure that all aspects of this procedure are followed and adhered to on all AECOM projects, sites and locations.
- If a specific tool is not included in the work instructions related to this procedure, appropriate guidelines shall be established prior to work associated with that tool, including following manufacturer's recommendations.
- Ensure compliance with applicable client requirements and restrictions regarding hand or power tools.

4.1.2 **Safety, Health and Environment (SH&E) Manager**

- Provide technical guidance and support as to this procedure and associated work instructions.

4.1.3 **Employees**

- Work only with tools for which they are appropriately trained and familiar with.
- Follow manufacturer's recommendations for its use and never modify the equipment without first obtaining authorization from the manufacturer.
- Comply with applicable client requirements and restrictions regarding hand or power tools.

4.2 Requirements

4.2.1 Always conduct a task hazard assessment (THA) prior to work commencing and include the identified hazards associated with the anticipated tool use.

4.2.2 No employee shall use any hand or power tool, unless they are familiar with the use and operation of the equipment or have received specific instruction on its use and operation.

4.2.3 All tools will be used for which they were designed and in accordance with manufacturer's specifications. Do not use tools for jobs they are not intended for. For example, do not use a slot screw driver as a chisel, pry bar, wedge or punch or wrenches as hammers.

4.2.4 Use approved tools only. Never modify or use makeshift tools.

4.2.5 Do not apply excessive force or pressure on tools unless permitted by the manufacturer's specifications. This includes additional force by hammering with body weight, foot or other tools.

4.2.6 Keep surfaces and handles clean and free of excess oil and grease to prevent slipping.

4.2.7 Do not carry sharp tools (e.g. knife, chisel, screwdriver, etc.) in pockets; this practice may cause puncture wounds.

4.2.8 All tools shall be properly maintained. Clean, dry, lubricate and repair tools as applicable, and return to a suitable toolbox, room, rack, or other storage area upon completion of a job.

4.2.9 Ensure proper ergonomics principles are observed when using hand and power tools, such as but not limited to:

- Avoid static and awkward positions when possible.
    - Move at intervals to reduce muscle fatigue.
    - Consider tools with a trigger strip, rather than a trigger button. This strip will allow the exertion of more force over a greater area of the hand that, in turn, will reduce muscle fatigue
- Do not apply excessive force or pressure on tools.
- If possible use tools with comfortable grips that are designed to allow the wrist to stay straight. Avoid using a bent wrist.
- Choose hand tools that have a centre of gravity within or close to the handle.
- Frequently used tools that weigh more than 1 pound (0.45 kilograms) should be counter-balanced.
- Ensure proper body positioning when using a tool to prevent slips or falls in the event of unanticipated tool behaviour (slip, kickback, etc.). Avoid over-reaching.
- Pull on tools such as a wrench or pliers whenever possible. Loss of balance is more likely when pushing if the tool slips. If pushing is necessary, hold the tool with an open palm.
- Hand-arm vibration exposure is associated with the use of hand tools.
    - Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
    - Consider the need for controls such as limiting time of use.
    - If safe to do so, adjust to a looser but stable grip, and use anti-vibration gloves.
- Use of heavy tools such as jackhammers can cause fatigue and strains. Heavy rubber grips can reduce these effects by providing a secure handhold.
- Do not increase a tool's leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.

4.2.10 Avoid placing fingers and hands in danger zones:

- Ensure hands and fingers have sufficient clearance in the event the tool slips.
- Ensure stability of the work-piece. Use work-piece holders (e.g. vise, chisel holder, etc.) whenever possible to prevent injury to hands or deflection of tool or work-piece.

- Use push sticks or guides when cutting or machining smaller material.

4.2.11 Secure tools when working from heights to prevent them from falling. Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use.

4.2.12 Utilize good housekeeping practices to ensure tools do not present a tripping hazard.

4.2.13 Ensure no part of a tool extends over the edge of the bench top. Place sharp tools (e.g., saws, chisels, knives) on benches so that sharp points or edges face away from the edge.

4.2.14 When using saw blades, knives, or other tools, if possible direct the tools away from aisle areas and away from other employees working in close proximity.

4.2.15 Do not throw tools from place to place or from person to person, or drop tools from heights. Hand them, handle first, directly to other workers.

4.2.16 Use non-sparking and intrinsically safe tools in atmospheres with flammable or explosive characteristics and where highly volatile liquids, and other explosive substances are stored or used.

- Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials shall be used.
- Electrical tools shall be identified as intrinsically safe.

4.2.17 If the task presents electrical hazards, worker must be competent and use the appropriate insulated tools to perform work that includes the risk of electrical shock. Cushioned grip handles do not protect against electrical shock.

4.2.18 The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

4.2.19 All tools designed to accommodate guards must have the guard(s) in place when the tool is in use. Do not modify, remove, or disable any machine guards.

4.2.20 Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.

4.2.21 Make provisions to prevent tools from automatically restarting upon restoration of power. Refer to *S3AM-325-PR Lockout Tagout*.

4.3 Training

4.3.1 Instruction in the proper use, safe handling, and maintenance of tools will be provided to employees unfamiliar with the tool.

- Assess the employee's training needs as per *S3AM-003-PR1 SH&E Training* procedure.
- Refer to the applicable work instructions associated with this procedure for any additional training specifics.
- Training shall include applicable manufacturer's recommendations and guidelines.

4.3.2 Employees shall demonstrate knowledge and competency in the use, safe handling and maintenance of the applicable tool prior to operation.

4.4 Personal Protective Equipment (PPE)

4.4.1 Utilize basic PPE appropriate to the task; gloves, safety-toed boots, hard hats and safety glasses with side shields. Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.4.2 Ensure lockout devices (padlocks, multiple lock hasps, tags) are utilized as necessary. Refer to *S3AM-325-PR Lockout Tagout*.

4.4.3 Ensure PPE is appropriate to the work and use additional PPE as required (e.g. mono-goggles, hearing protection, respiratory protection, etc.).

- Dual eye protection is required to be worn by any employee undertaking or within 3 ½ feet (1 meter) of a task that produces projected particles or material.
- Head and face protection is recommended for employees working with pneumatic tools.
- Noise hazard is associated with pneumatic and many other tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

4.4.4 Screens shall also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

4.4.5 Refer to the applicable work instructions associated with this procedure for any additional specialized PPE.

4.5 Inspections

4.5.1 All tools must be inspected prior to each use.

- Any tool that is defective or has missing parts must not be used.
- Every broken or defective tool must be tagged ‘out of service’ or ‘do not use’ and immediately removed from service.
- Tagged tools will be returned to the supervisor for repair or replacement.

4.5.2 All tools must be inspected to manufacture’s specifications and according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly. Refer to *S3AM-305-FM1 Hand & Power Tool Maintenance Inventory* and *S3AM-305-FM2 Hand & Power Tool Inspection Report*.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-305-ATT1 Chainsaw

6.2 S3AM-305-ATT2 Circular Saw

6.3 S3AM-305-ATT3 Cut Off Saw

6.4 S3AM-305-ATT4 Handheld Grinder

6.5 S3AM-305-ATT5 Impact Wrench

6.6 S3AM-305-ATT6 Nail Gun

6.7 S3AM-305-ATT7 Dustless Vacuum

6.8 S3AM-305-ATT8 Power Drill

6.9 S3AM-305-ATT9 Pressure Washer

6.10 S3AM-305-ATT10 Reciprocating Saw

6.11 S3AM-305-ATT11 Sander

6.12 S3AM-305-ATT12 Knives

6.13 S3AM-305-ATT13 Clearing & Grubbing Equipment

6.14 S3AM-305-ATT14 Pneumatic Tools

6.15 S3AM-305-ATT15 Manual Hand Tools

6.16 S3AM-305-ATT16 Small Engines

6.17 S3AM-305-ATT17 Electric & Battery Hand Tools

6.18 S3AM-305-FM1 Hand & Power Tool Maintenance Inventory

6.19 S3AM-305-FM2 Hand & Power Tool Inspection Report

Americas

Chainsaw

S3AM-305-ATT1

1.0 Objective / Overview

1.1 Available in a variety of types and capacities, chainsaws are one of the most powerful, yet dangerous cutting tools available.

1.2 Working safely with a chain saw includes proper training, good body mechanics and felling technique, well-maintained equipment, and protective clothing.

2.0 Hazards

2.1 Improper operation (kickback – sudden and violent reverse movement of the saw)

2.2 Hand/arm vibration

2.3 Noise

2.4 Flying/falling debris

2.5 Sharp, moving blade

2.6 Defective tool

3.0 Safe Operating Guidelines

3.1 Only approved operators are permitted to operate a chainsaw.

3.2 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT16 Small Engines* for additional guidelines.

3.3 Inspect saws prior to use and periodically during use:

- 3.3.1 A sharp chainsaw is safer than a dull one. Worn chains shall be replaced immediately.
- 3.3.2 Keep the saw clean, lubricated, and adjusted.
- 3.3.3 Inspect and test the chain brake, chain catch, throttle lock, handles and guards, all nuts and bolts, spark arrestor, and muffler and air filter.
- 3.3.4 The chain tension should be properly adjusted and the carburetor tuned. The idle must be correctly adjusted; the chain should not move when the saw is in the idle mode.
- 3.3.5 Ensure the saw is fitted with an inertia break and hand guard.
- 3.3.6 Ensure the saw is fueled with the appropriate fuel type.
- 3.3.7 Do not operate a chain saw that is damaged or improperly adjusted, or is not completely and securely assembled**.** If a chainsaw is defective, remove it from service, and tag it clearly "Out of service for repair" or "Do Not Use". Replace damaged equipment immediately – do not use defective tools "temporarily." DO NOT ATTEMPT FIELD REPAIRS.

3.4 Never "drop start" the saw (the saw is held in the air with one hand on the handlebar and the other on the pull cord) as no control is provided to prevent rotation of the saw back toward the user.

3.5 Ensure an appropriately sized fire extinguisher or fire-fighting equipment is readily available.

3.6 A chainsaw is not only dangerous to the operator but also to surrounding persons. Do not allow others in the area when chainsaws are operated.

3.7 Never operate a chain saw when fatigued.

3.8 Make sure there are no nails, wire, or other imbedded material in the material to be cut that can cause flying particles or kickback.

3.9 Keep all parts of the body away from the saw chain when the engine is running.

3.9.1 Keep the saw close to the body.

3.9.2 Bend from the knees, not the waist. Improper lifting techniques and poor posture contribute to injuries.

3.9.3 Always avoid standing on the log and making cuts with the saw between your legs; always cut with the saw to the outside of your legs.

3.9.4 Always stand to one side of the limb to be cut, never straddle it.

3.9.5 Never cut above chest height.

3.10 Determine where the tree/limb will fall prior to cutting.

3.10.1 Start cutting only after a clear escape path has been made.

3.10.2 Always ensure that personnel and equipment are not in the path of the falling tree/log, and that you have time to move away.

3.10.3 If necessary, flag/or fence off the area to prevent entry.



Blade nose strikes another object



Improper starting of bore



Top or blade nose touches bottom or side of kerf during reinsertion

3.11 Always keep in mind where the chain will go if it breaks; never position body or allow others in line with the chain.

3.12 Avoid operations that could result in kickback of the saw towards the operator.

3.13 Keep the chain out of the dirt, debris will fly, the teeth will be dulled and the chain life shortened.

3.14 Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.

4.0 Personal Protective Equipment

4.1 Dual eye protection – safety glasses with side shields and a face shield

4.2 Chainsaw Chaps

4.3 Wear appropriate apparel. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.

4.4 Safety toe work boots

4.5 Hardhat with lateral impact protection

4.6 Gloves providing impact, abrasion, cut, tear, & puncture resistance

4.7 Hearing Protection

Americas

Circular Saw

S3AM-305-ATT2

1.0 Objective / Overview

1.1 The circular saw is used in cutting wood products (e.g. plywood, construction lumber, etc.).

1.2 Safe measures for use include proper training, good body mechanics and operating technique, well-maintained equipment, and protective equipment.



2.0 Hazards

2.1 Kickback – Sudden and violent reverse movement of the saw

2.2 Noise

2.3 Flying debris

2.4 Sharp, moving blade (severe cuts)

2.5 Defective tool

2.6 Improper operation

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Use sharp blades and ensure cracked and dull blades are removed from service. Dull blades cause binding, stalling and possible kickback.

3.3 Use the correct blade for the application and check for proper operation before each cut.

3.4 Check often to ensure that guards return to their normal position quickly. Never defeat the guard to expose the blade.

3.5 Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw.

3.6 A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work position.

3.7 Before starting a circular saw, be sure the power cord and extension cords are out of the blade path and are long enough to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.

3.8 Secure the work being cut to avoid movement.

3.9 For maximum control, hold the saw firmly with both hands after securing the work piece.

3.10 Keep the upper and retracting lower blade guard and the motor free from dust.

3.11 Do not hold or force the retracting lower guard in the open position.

3.12 Do not over tighten the blade-locking nut.

3.13 Do not twist the saw to change, cut or check alignment.

3.14 Do not use a saw that vibrates or appears unsafe in any way.

3.15 Do not force the saw during cutting.

3.16 Do not cut materials without first checking for obstructions or other objects such as nails and screws.

3.17 Check frequently to be sure clamps remain secure.

3.18 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest. Use a push stick or guide when cutting operation requires the hands of the operator to come close to the blade.

3.19 Do not overreach. Keep proper footing and balance.

3.20 When starting the saw, allow the blade to reach full speed before contacting the work piece.

3.21 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.

3.22 Never place hand under or in front of the shoe or guard of the saw when operating.

3.23 Cut at the proper depth (¼ inch / 0.64 centimeters) below work surface. Set the depth of the blade prior to use, when the saw is unplugged.

4.0 Personal Protective Equipment

4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewelry can become caught in moving parts.

4.2 Gloves that provide cut, abrasion and impact resistance.

4.3 Kickback apron as necessary.

4.4 Safety toed boots.

4.5 Safety glasses with side shields and faceshield.

4.6 Hearing Protection.

Americas

Cut Off Saw

S3AM-305-ATT3

1.0 Objective / Overview

1.1 Cut-off saws are high-speed cutting tools and very dangerous to operate. Therefore, it is very important to review the general safety rules, training, Personal Protective Equipment and procedures for working with portable cut off saws.

1.2 Cut off saws are used in a variety of activities (i.e. concrete, piping, metal, etc.).

2.0 Hazards

2.1 Noise

2.2 Flying debris

2.3 Sharp, moving blades (severe cuts)

2.4 Ignition sources (hot engine, sparks)

2.5 Hand/arm vibration

2.6 Kickback – Sudden and violent reverse movement of the saw

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* or *S3AM-305-ATT16 Small Engines* for additional guidelines

3.2 In addition to inspecting the general tool prior to operation, inspect the abrasive wheel for cracks and chips and appropriate wheel type.

- 3.2.1 If cracked or chipped, replace wheel before use.
- 3.2.2 Do not use abrasive-type wheels for rough grinding.

3.3 Ensure the saw is started in accordance with manufacturer's specifications:

- 3.3.1 Start the saw on firm ground or other solid surface in an open area.
- 3.3.2 Never "drop start" the saw as in the above picture (the saw is held in the air with one hand on the handlebar and the other on the pull cord) as no control is provided to prevent rotation of the saw back toward the user.

3.4 Handling

- 3.4.1 Hold the saw firmly with two hands when the engine is running, and whenever the blade is rotating until it comes to a complete stop.
- 3.4.2 Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.

3.5 Cutting

- 3.5.1 Clear the working area.
- 3.5.2 Begin cutting at full throttle and continue at full throttle until the cut is finished.
- 3.5.3 Avoid standing in a direct line with the cutting wheel.
- 3.5.4 Use only downward pressure on the saw, as lateral pressure may cause the blade to break and shatter.

3.5.5 Do not change the direction of the cut once started, as this can also cause the blade to break and shatter.

3.5.6 Do not cut above shoulder height.

3.5.7 Avoid operating the saw if the terrain is wet and/or frozen.

3.5.8 Keep flammable and combustible materials away from saw while cutting.

3.5.9 Ensure an appropriate fire extinguisher or fire-fighting equipment is readily available.

3.6 Maintenance

3.6.1 Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

4.0 Personal Protective Equipment

4.1 Safety glasses with side shields and faceshield.

4.2 Chainsaw chaps.

4.3 Safety toe work boots.

4.4 Gloves that provide cut abrasion and impact resistance.

4.5 Hearing protection: earplugs and/or earmuffs.

4.6 Respirator if required (concrete operations).

Americas

Handheld Grinder

S3AM-305-ATT4

1.0 Objective / Overview

1.1 Handheld grinders are high-speed electric- or pneumatic-powered grinding tools used to shape or cut metal, and can be dangerous to operate.

1.2 Grinders are used in a variety of activities (i.e., piping installation/repair, metal, restoring, polishing, sharpening, etc.).

2.0 Potential Hazards

2.1 Kickback – Sudden and violent reverse movement of the grinder

2.2 Electric shock

2.3 Flying debris

2.4 An improperly installed or incompatible wheel can break or explode and cause injury.

2.5 Moving parts (severe cuts)

2.6 Fire hazard from sparks igniting nearby debris or objects

2.7 Noise

2.8 Hand/arm vibration

3.0 Safe Operating Guidelines



3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Inspect the tool before every use. Damaged tools must be removed from use and tagged "DO NOT USE".

3.3 Grinder guards are to be used at all times and must not be altered.



3.3.1 US requirements specify a maximum of 180° of the grinding wheel to be exposed.

3.3.2 While 120° coverage may be permissible in certain jurisdictions, guards that are greater are not to be cut down.

3.3.3 Replace damaged or defective guards immediately

3.4 Grinders must be used with an unmodified manufacturer supplied handle at all times. If removal of the handle is required the reason must be appropriately documented and approved by project / location manager and SH&E manager or designee. Client approval may also be required.

3.5 Trigger locks are not permitted. If a grinder is found with a trigger lock, the lock shall be disabled.

3.6 Never use the grinder for jobs for which it is not designed (e.g. cutting with a grinding wheel vs. cutting disc).

3.7 Grinders must be permanently marked with the manufacturer's established maximum RPM (revolutions per minute).

3.8 Inspect the disk or wheel prior to operation:

3.8.1 Wire wheels must be inspected for loose and broken wires.

3.8.2 Ensure the RPM (as posted on the wheel) is equal to or greater than that posted on the grinder, the disk / wheel is the correct size for the grinder, and the type of wheel is compatible with the material being ground or cut.

3.8.3 Wheels must be replaced as specified by the manufacturer. In the absence of specifications a wheel shall not be worn down to a size which would allow the mounting flange assembly to contact the work-piece or work-piece holding fixture.

3.8.4 Ensure the disk or wheel is checked for cracks or other damage. A ring test can be conducted on clean, dry, unmounted wheels greater than 4" (10.16 centimeters) in diameter:

- Suspend the wheel by its arbor hole;
- Use a non-metallic tool (wood, plastic) to gently tap the wheel at 45° from the vertical center line on either side of the wheel, approximately 1 to 2 inches (2.5 – 5 centimeters) from the edge;
- Rotate the wheel 45° and repeat the process until the entire wheel has been tested;
- A wheel that emits a metallic ring indicates absence of damage, whereas a dull sound means the wheel should be removed from service.

3.8.5 If cracked, chipped, or there is any other evidence of damage, remove from service and replace wheel before use.

3.9 When mounting the wheels:

3.9.1 Grinders must be unplugged before changing wheels, discs or positioning guards.

3.9.2 Follow manufacturer's specifications (e.g. stamp facing grinder, mount up, mount down, etc.)

3.9.3 Ensure that the mounting flanges are clean and the mounting blotters are used.

3.9.4 Do not over tighten the mounting nut.

3.9.5 Before grinding or cutting, run newly mounted wheels at operating speed to check for vibrations.

3.10 General Safety Provisions

3.10.1 Ensure abrasive wheels are stored according to manufacturer specifications (absence of temperature extremes and solvents, dry area protected from impact, first in first out).

3.10.2 Keep the work area clean. Do not grind near flammable and combustible materials. Sparks can ignite debris and flammable vapors. A fully charged fire extinguisher must be located nearby. Use of a fire blanket may be necessary.

3.10.3 All observers should be kept at a safe distance from the work area to ensure they are protected from flying debris / sparks. Whenever practicable, use screens or shields.

3.10.4 Always secure work with clamps or a vise, freeing both hands to operate the tool. Never clamp a handheld grinder in a vice.

3.10.5 Use grinding wheels only at their rated speed.

3.10.6 Ensure safety guard(s) is positioned properly prior to start-up.

3.10.7 Allow the grinder to come to full operating speed before beginning grinding operation.

3.10.8 Do not use the side of a grinding wheel unless the wheel is designed for side grinding.

3.10.9 Always stand to the side of the wheel, never directly behind it.

- Be sure to keep your footing and maintain proper balance. Keep hands, fingers, and other body parts from coming into contact with the revolving wheel.
- While in operation, grinder shall be held with a firm grip using both hands. One engaging the trigger, and the second holding the handle.

3.10.10 Grinding aluminum is prohibited.

3.10.11 Tools shall be maintained with care. They should be kept clean and sharp for the best performance. Follow instructions in the user's manual for lubricating and care instructions.

4.0 Personal Protective Equipment (PPE)

4.1 Please refer to *S3AM-208-PR1 Personal Protective Equipment* for further information.

4.2 Gloves providing appropriate heat, impact, abrasion, cut, tear, & puncture resistance.

4.3 Wear appropriate apparel. Long-sleeved shirts and pants are required; clothing shall be made of natural fibers. Synthetics are not permitted. Note: Long hair, loose or baggy clothing, hoodie strings, ties, or jewelry can become caught in moving parts.

4.4 Dual eye protection required - Safety glasses with sideshields and properly impact-rated face shield. Welding helmets used as a face shield shall be verified as approved by CSA / ANSI for protection against impact.

4.5 Safety toe work boots.

4.6 Hearing protection: earplugs and/or earmuffs.

4.7 Other PPE as necessary for the work site/activity (e.g., hard hat, respiratory protection).

Americas

Impact Wrench

S3AM-305-ATT5

1.0 Objective / Overview

1.1 Impact wrenches are mainly used for tire changing but that does not limit their use. They can be used in all applications when a certain amount of torque is needed to loosen or tighten nuts and bolts.

1.2 The danger comes in to play when employees try to use the wrong sockets with an air wrench. Employees using air wrenches must have a general understanding of how to use them.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Cuts

2.4 Hand/arm vibration

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT14 Pneumatic Tools* for additional guidelines.

3.2 Impact wrench sockets and accessories must be used with this tool. Do not use hand sockets and accessories.

3.3 The proper fastening torque may differ depending upon the kind or size of the bolt.

3.4 Check the torque with a torque wrench.

3.5 Connect tool to air hose of recommended size.

3.6 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.

3.7 If the proper retaining device on the tool is broken, the tool shall be removed from service to be repaired.

3.8 On applications where a low or critical level of torque is required, it is recommended that each fastener is impacted lightly. Then perform the final tightening with a hand torque wrench.

4.0 Personal Protective Equipment

4.1 Safety toed boots

4.2 Anti-vibration gloves with impact and abrasion and cut resistance.

4.3 Safety glasses with side shields.

4.4 Hearing protection.

Americas

Nail Gun & Stapling Tool

S3AM-305-ATT6

1.0 Objective / Overview

1.1 Nail guns and stapling tools (pneumatic power-fastening devices) are useful, but must be handled with care.

1.2 Nail guns and stapling tools have been shown to be the cause of unnecessary injuries when the design of the gun places emphasis on speed, rather than safety.

2.0 Potential Hazards

2.1 Flying debris/nails

2.2 Imbedded object

2.3 Puncture wounds

2.4 Noise

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand &Power Tools*, and *S3AM-305-ATT14 Pneumatic Tool* for additional guidelines.

3.2 Permit only experienced and trained persons to operate pneumatic nailing and stapling tools. Never let an inexperienced worker use a nail gun without supervised training.

3.3 Never point a nail gun or stapling tool toward the body or any other personnel.

- 3.3.1 Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.
- 3.3.2 Be aware of other workers in the work area.
- 3.3.3 Be aware of what is located behind the nailing surface. Never place hands or other body parts directly behind the nailing surface.
- 3.3.4 Ensure no one is in the line of fire should an incorrectly selected fastener eject out the other side of the material.

3.4 Inspect a tool before connecting it to air supply:

- 3.4.1 Check tool safety mechanisms if applicable. Never disable a safety tip on a nail gun or stapling tool.
- 3.4.2 Tighten securely all screws and cylinder caps.
- 3.4.3 Pneumatic power-fastening devices that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a safety interlock to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.

3.5 Check correct air supply and pressure before connecting a tool.

3.6 Check that the tool is correctly and securely connected to the air supply hose and that it is in good working order, with the safety mechanism operative, before using.

3.7 Always handle a tool as if it loaded with fasteners (nails, staples, etc.). Do not carry a tool with a finger on the trigger or with the trigger depressed.

3.8 Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.

3.9 Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.

3.10 Disconnect a tool from the air supply and ensure the air is completely exhausted from the tool when the tool is unattended, when loading with fasteners (nails, staples), and during cleaning or adjustment.

3.11 Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool and the tool is disconnected from the air supply.

3.12 Use only fasteners recommended by the manufacturer. Ensure fasteners are appropriate to the work surface to ensure fastener does not eject completely through the material.

3.13 Avoid nailing into knots as nail can splinter wood.

3.14 Permit only properly trained people to carry out tool maintenance.

3.15 Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface and properly aligned both vertically and horizontally with the surface

3.16 Do not overreach. Keep proper footing and balance.

3.17 Ensure the hand not holding the nail gun or stapling tool is a minimum of12 inches (30cm) away from the nosepiece of the tool.

3.18 Keep the gun properly aligned with your work both vertically and horizontally.

4.0 Personal Protective Equipment

4.1 Gloves providing appropriate protection to the task (e.g. impact, puncture, chemical, etc.).

4.2 Safety toed boots.

4.3 Use hearing protection, where required.

4.4 Wear safety glasses with side shields at all times and face shield if flying debris may be encountered.

Americas

Dustless Vacuum

S3AM-305-ATT7

1.0 Objective / Overview

1.1 Dustless decontamination system (also refered to as Pentek brand name) removes and packages surface contamination from concrete and steel structures.

1.2 The Pentek integrated suite of manually operated equipment (e.g., squirrel III, corner cutter, roto-peen, and crack chaser) is designed for the safe removal of radioactive materials, lead-based paints, polychlorinated biphenyls, pesticides, chemical residues, and other contaminated coatings.

1.3 The Pentek system incorporates a high-performance vacuum and waste packaging unit, the VAC-PAC, in conjunction with pneumatically operated equipment to remove contaminated material. Dust and debris are captured at the cutting tool surface. Supporting equipment required to operate the unit includes a 60 kilowatt generator and an air compressor (minimum 350 cubic feet capacity), as well as a drum grappler for drum handling activities.

2.0 Hazards

2.1 Noise

2.2 Vibration

2.3 Tripping

2.4 Hot surfaces (vacuum unit)

2.5 Electrical (high voltage)

2.6 Pinch

2.7 Back strain

2.8 High pressure air

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand &Power Tools*, and *S3AM-305-ATT14 Pneumatic Tool* for additional guidelines.

3.2 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.

3.3 The vacuum unit should be placed a minimum of 50 feet (15.2 meters) away from the work area.

3.4 Once in position to begin work, apply the brake to stabilize the unit. When raising the VAC-PAC to insert/remove a drum, do not place your body or any extremity under the VAC-PAC while it is in the raised position.

3.5 Two workers should be used to maneuver the unit into place.

3.6 A minimum 10 feet (3 meters) clearance will be established around the unit while in operation.

3.7 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.

3.8 A competent person will train each worker in the operation of the unit.

3.9 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY. Always know where the emergency stop is located.

3.10 Operators of a motorized drum grappler must be trained in agreement with the powered industrial truck

standard. Refer to *S3AM-324-PR1 Powered Industrial Trucks*.

3.11 Review *S3AM-302-PR1 Electrical Safety* prior to refueling the electrical generator and/or compressor.

4.0 Personal Protective Equipment

4.1 Leather gloves (maintenance).

4.2 As applicable, Tyvek suit (with hood).

4.3 Anti-vibration gloves (operation).

4.4 Hearing protection (plugs or muffs).

Americas

Power Drill

S3AM-305-ATT8

1.0 Objective / Overview

1.1 Available in a variety of types and capacities, portable power drills are undoubtedly the most used power tools.

1.2 Because of their handiness and application to a wide range of jobs, drills often receive heavy use. For this reason, you will need to carefully check your drill's capacity limitations and accessory recommendations.

2.0 Hazards

2.1 Electricity

2.2 Flying debris

2.3 Rotating and sharp parts

2.4 Burns (hot bits)

2.5 Manual handling (sprains/strains - wrist)

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Always keep drill bits sharp.

3.3 Disconnect the power supply before changing or adjusting bit or attachments,

3.4 Do not use high speed steel (HSS) bits without cooling or using lubrication.

3.5 Be sure the chuck is tightly secured to the spindle. This is especially important on reversible-type drills. Tighten the bit securely as described by the owner/operators manual.

3.6 The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury-inflicting missile.

3.7 Secure workpiece being drilled to prevent movement.

3.8 If the bit is long enough to pass through the material, select a shorter drill bit or provide against damage and injury.

3.8.1 Prevent other workers from accessing the area.

3.8.2 Remove or provide coverage for material that could be damaged by the drill bit.

3.9 Secure magnetic drills with a chain or rope to prevent falling. Label cord connections to prevent unplugging.

3.10 Check auxiliary handles, if part of the tool. Be sure they are securely installed.

3.11 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.

3.12 Grasp the drill firmly by insulated surfaces.

3.13 Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise -- forward -- direction, brace the drill to prevent a counter-clockwise reaction.

3.14 Do not overreach. Always keep proper footing and balance.

3.15 Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve

the pressure. Forcing the drill can cause the motor to overheat, damage the bit and reduce operator control.

4.0 Personal Protective Equipment

4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.

4.2 Gloves that provide cut, abrasion and impact resistance.

4.3 Safety toed boots.

4.4 Safety glasses with side shields and face shield.

4.5 Hearing protection.

Americas

Pressure Washer

S3AM-305-ATT9

1.0 Objective / Overview

1.1 Pressure washing can be divided into three categories based on the water pressure the equipment is capable of producing:

- Ultra high pressure jetting – greater than 30,000 psi
- High pressure washing – 5,000 to 30,000 psi
- Pressure washing – less than 5,000 psi

1.2 Generally, light duty portable pressure washing equipment and car washes produce less than 5,000 psi. High pressure washing equipment is often used for such tasks as cleaning vessels and process piping. Ultra high pressure jetting is also often employed to clean vessels and to remove coatings and scaling of production equipment. If not used correctly and safely, pressure washers can be dangerous piece of work equipment.

1.3 AECOM only allows trained, authorized personnel to operate the high pressure washers. Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Hazards

2.1 Kickback – Sudden and violent reverse movement of the gun

2.2 Flying debris

2.3 Slips and trips on wet surfaces and hoses

2.4 Noise

2.5 Manual handling

2.6 Exhaust fumes/carbon monoxide (CO) in enclosed spaces

2.7 Contact with high pressure / high temperature fluids

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, *S3AM-305-ATT17 Electric & Battery Hand Tools* or *S3AM-305-ATT16 Small Engines* for additional guidelines.

3.2 Ensure area is properly flagged with tags identifying work being performed and hazards. Keep all unauthorized workers out of area while job in progress.

3.3 Inspect all hoses, fittings, wands, cords and hose reel for damage or defects.

3.3.1 Equipment is complete and assembled correctly (i.e. nozzle tip correctly connected to the wand and not directly to hose).

3.3.2 Ensure trigger mechanism is functioning properly.

3.3.3 Fittings are securely attached.

3.3.4 Insulated components are in place.

3.4 Check fuel connections and hoses for signs of leaks, defects or damage.

3.5 Confirm nozzle / jets are clear by turning on water, without pump pressure.

3.6 Check pressure pump oil level before use. Hold the wand firmly with the trigger released when turning the pump on.

3.7 Recheck hoses once the system is pressurized.

3.8 Never service equipment while energized or pressurized.

3.9 Ensure other personnel are clear of area while pressure washer is pressurized. Non-operators must remain a minimum of 25 feet (7.6m) from the operator.

3.10 Do not wash at a 90 degree angle to minimize spray and flying debris.

3.11 Never point a pressure washer at yourself or others. Contact with high pressure fluid can result in serious cut or injection injuries.

3.12 Increase pressure slowly during operation to prevent hose kick-back.

3.13 Do not drive over, pull on, or kink the high pressure hose. Damage to the hose may compromise the wire braiding inside and cause the hose to burst.

3.14 Whip checks must be used for all high pressure connections.

3.15 High-pressure washing equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.

3.16 Always set the trigger safety lock when the gun valve is not in use.

3.17 Relieve the pressure in the system before coupling and uncoupling hoses.

3.18 Visually inspect the full length of high pressure discharge hose and inspect other high pressure fluid-handling components for abrasions or cuts, damage caused by exposure to chemicals and for damage caused by kinks in the hose.

3.19 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.

3.20 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.

3.21 Maintain a distance from the spray contact point to reduce noise exposure and risk of being struck by flying debris. Avoid overreaching and maintain a stable stance.

3.22 When shutting down a pressure washer, turn the pump off before turning the water supply off.

3.23 After turning off pressure washer, ensure all residual pressure is released from system by squeezing the trigger. Consult the operator’s manual for any other procedures specific to the equipment for shut-down.

3.24 Protect unit from freezing, when applicable.

4.0 Personal Protective Equipment

4.1 Hardhat.

4.2 Safety glasses with side shields and a face shield.

4.3 Gloves providing appropriate protection (rubber, chemical).

4.4 Hearing protection.

4.5 PVC (or equivalent) rain suit.

4.6 Safety toed boots with metatarsal protection.

Americas

Reciprocating Saw

S3AM-305-ATT10

1.0 Objective / Overview

1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.

1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Sharp, moving parts (cuts)

2.4 Hand/arm vibration

2.5 Electricity

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.

3.3 Ensure appropriate blade selection. Different work surfaces demand different blades

3.4 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height. Always use two hands to operate the saw.

3.5 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.

3.6 The work piece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.

3.7 Maintain firm contact between the saw's shoe and the material being cut.

3.8 When making a "blind" cut (cannot see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.

3.9 If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire.

3.10 Water pipes must be drained and capped.

3.11 Always hold the tool by the insulated grouping surfaces. When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work piece. This prevents breakage of the blade, and possible loss of tool control. Do not operate reciprocating saw in explosive atmospheres.

3.12 Do not overreach. Keep proper footing and balance at all times.

3.13 Check for misalignment or binding of moving parts, breakage or parts and any other condition that may affect the tool's operation.

4.0 Personal Protective Equipment

4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewelry can become caught in moving parts.

4.2 Gloves that provide cut abrasion and impact resistance.

4.3 Kickback apron, as necessary.

4.4 Safety toed boots.

4.5 Safety glasses with side shields and face shield.

4.6 Hearing protection.

Americas

Sander

S3AM-305-ATT11

1.0 Objective / Overview

1.1 Sanders are commonly used at project sites for a variety of tasks.

1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and personal protective equipment (PPE) selection.

2.0 Potential Hazards

2.1 Kickback – Sudden and violent reverse of the sander

2.2 Noise

2.3 Hand/arm vibration

2.4 Dust exposure

2.5 Flying debris

2.6 Severe abrasive parts

2.7 Electricity

2.8 Fuel (fine dust) and ignition sources (electricity, friction)

3.0 Safe Operating Guidelines

3.1 Review manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.

3.3 Inspect sanding belts before use. Replace those belts that are worn or frayed.

3.4 Install sanding belts that are the same widths as the pulley drum.

3.5 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.

3.6 Secure the sanding belt in the direction shown on the belt and the machine. Keep hands away from the sanding belt.

3.7 Before starting a sander, be sure the power cord and extension cords are out of the belt path and are long enough to freely complete the task. The sander must be either double insulated or connected to a ground fault circuit interrupter.

3.8 Use two hands to operate sanders – one on the trigger and the other on the front handle knob. Move sanders away from the body.

3.9 Clean dust from the motor and vents at regular intervals.

3.10 Do not use a sander without an exhaust system or dust collector present that is in good working order. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential as well as guarding against open flame and sparks.

3.11 Empty the collector when ¼ full. Minimise dust disturbance when emptying the collector.

3.12 Do not exert excessive pressure on a moving sander. The weight of the sander provides adequate pressure for the job.

3.13 Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stop into place or use a ‘stop block’ to prevent movement.

3.14 Do not overreach. Always keep proper footing and balance.

3.15 Do not cover air vents of the sander.

3.16 Check often to ensure that guards are in their normal position.

4.0 Personal Protective Equipment

4.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.

4.2 Gloves that provide cut, abrasion and impact resistance.

4.3 Safety toed boots.

4.4 Safety goggles and faceshield.

4.5 Hearing protection.

4.6 Respiratory protection, as necessary.

Americas

Knives

S3AM-305-ATT12

1.0 Objective / Overview

1.1 Knives serve a variety of purposes at work sites, and can be a useful tool, when used safely and correctly.

1.2 Learning proper positioning and correct usafe of a knife will drastically reduce the potential of cut-related injuries.

2.0 Hazards

2.1 Improper body positioning

2.2 Improper knife selection

2.3 Defective knife

2.4 Improper knife operation (including storage)

3.0 Safe Operating Guidelines

3.1 Select the appropriate knife for the task. Consider using a rounded tip blade if the task allows.

3.2 Always be sure that knives are sharp and not dull. A dull blade will require more force to cut, increasing the likelihood injury (e.g. hand slipping, knife breaking, etc.). Replace dull blades – A knife that tears rather than cuts, generally indicates the blade is dull.

3.3 Be sure the blade is seated in the frame of the knife correctly, closed, and fastened together properly.

3.4 Always direct the cut away from yourself and others

- 3.4.1 Keep body parts away from the cut line, (e.g., fingers, leg, etc.)
- 3.4.2 Ensure that the material being cut is stabilized and not against a body part (e.g. cutting rope against your leg).
- 3.4.3 Always pull the knife, never push the knife (the blade may break, and momentum could cause the body to come into contact with broken blade).

3.5 Ensure knife blades are protected or retracted when not in use.

- 3.5.1 Never carry a knife with an exposed blade in your pocket.

3.6 Use of razor and break away utility knives is prohibited.

- 3.6.1 Purchase safety-equipped utility knives with guarding or automatically retracting blades.

3.7 When using a knife to cut thicker materials, use several passes. Increased force on the blade can cause it to stray from the intended cut path, or break the blade.

3.8 When changing blades, always handle from the non-sharp side. Cover blade with duct tape and dispose.

3.9 Use an alternate tool when possible (scissors, wire cutters, etc.).

3.10 Let a falling knife fall.

4.0 Personal Protective Equipment

4.1 Cut resistant gloves are mandatory when using knives (Kevlar, thick leather, etc.).

Americas

Clearing & Grubbing Equipment

S3AM-305-ATT13

The following safety precautions will be followed during site clearing and tree falling.

1.0 General

1.1 Refer to *S3AM-305-PR1 Hand & Power Tools* for additional guidance.

1.2 As applicable, refer also to *S3AM-305-ATT15 Manual Hand Tools, S3AM-305-ATT16 Small Engines,* and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidance.

1.3 All clearing activities shall terminate during electrical storms and periods of high winds.

1.4 Dead, broken or rotted limbs or trees (widow makers) shall be felled first.

1.5 Be aware of the presence of other personnel when using any tool, especially picks or axes.

2.0 Machete, Pick and Axe Use

2.1 A machetes, picks and axes will only be used for their designated purpose; do not carelessly swing the tool when it is not needed.

2.2 To prevent lacerations, employees will wear Kevlar gloves and Kevlar chain saw chaps.

2.3 Machetes, picks and axes shall not be used when other employees are in the immediate work area.

3.0 Use of Weed Whips

3.1 Weed whips may be used to clear vegetation such as grass, light brush, briars and tree seedlings. The L-shaped weed whip cuts grass and weeds but is unstable for use on larger growth; the triangular-frame weed whip cuts briars and woody stems up to a half-inch in diameter. A “Suwannee” sling is a heavy duty weed whip that also has an axe blade. It does the same work as a weed whip, but can also cut through large materials. The heavier weight of this tool allows it to more easily cut off larger material than a weed whip.

3.2 When using weed whips, employees should follow these safety procedures:

3.2.1 Select the correct tool for the types and size of vegetation present across the landfill.

3.2.2 Employees will wear gloves that provide impact, abrasion, cut, tear, and puncture resistance when using weed whips.

3.2.3 Weed whips are meant to be swung back and forth with both hands. Avoid using a golf swing. The tool should be swung no higher than an employee’s side.

3.2.4 Strong swings should be made to prevent the blade from bouncing or glancing off springy growth.

3.2.5 Screws hold the serrated double-edge blade in place. These screws can work loose so check them before each use.

3.2.6 At the end of the day, inspect the whips for damage. Clean, sharpen, and oil as necessary and store with a sheath in place.

4.0 Chain Saws

4.1 Refer to *S3AM-305-ATT1 Chainsaw.*

5.0 Felling Trees Manually

5.1 Before cutting begins, survey the work area for dead limbs, the lean of the tree to be cut, wind conditions and the location of other trees.

5.2 Remove lodged trees (tree has not fallen to the ground after being separated from its stump) as soon as possible. Never work under a lodged tree.

5.3 The distance between workers should be maintained at twice the height of the trees being felled.

6.0 Chipping Operations

6.1 Prior to use, make sure all safety devices and controls, such as emergency shut-off devices, are tested and verified to be functioning properly.

6.2 Access covers and doors shall not be opened until the drum or disk is at a complete stop.

6.3 Infeed and discharge ports shall be designed to prevent employee contact with disc, knives and blower blades.

6.4 The operator must be completely familiar with the controls and proper use of the equipment.

6.5 Workers feeding material into self-feeding wood chippers are at risk of being fed through the chipper if they reach or fall into the infeed hopper or become entangled in branches feeding into the machine.

6.5.1 Make sure two workers (buddy system) are in close contact with each other when operating the chipper.

6.5.2 Stand to the side of the chipper while inserting limbs into chipper, never stand directly in front.

6.5.3 Insert trunk portion of tree/limb first. This will prevent the branches from getting entangled with clothing, etc. and pulling you in with the tree/limb.

6.5.4 Bystanders should be kept at least 25 feet (7.6m) away when in operation.

6.5.5 Keep the area around the wood chipper free of tripping hazards.

6.6 Never wear loose clothing that may get caught on feed material or moving parts.

7.0 Personal Protective Equipment

7.1 Wear proper apparel for the task.

7.1.1 Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.

7.1.2 Wear clothing with long sleeves and full length pants of durable material.

7.2 Use gloves that provide impact, abrasion, cut, tear and puncture resistance.

7.3 Safety toed boots with ankle support.

7.4 Safety glasses with side shields and face shield.

7.5 Hearing protection as necessary.

Americas

Pneumatic Tools

S3AM-305-ATT14

1.0 Objective / Overview

1.1 Pneumatic tools utilize air pressure to perform the tool's task.

1.2 Safe measures for use include proper training, good body mechanics and operating technique, well-maintained equipment, and protective equipment.

1.3 There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

2.0 Hazards

2.1 Improperly secured air hoses

2.2 Noise

2.3 Flying debris

2.4 Defective tool

2.5 Improper operation

3.0 Safe Operating Guidelines

3.1 Review the manufacturer's operating manual, *S3AM-305-PR1 Hand & Power Tools*, and *S3AM-305-ATT17 Electric & Battery Hand Tools* for additional guidelines.

3.2 Never use bottled gas as a power source for pneumatic tools.

3.3 Drain water from air compressor tank and condensation from air lines.

3.3.1 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.

3.4 Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected. Pneumatic tools must have the air supply controlled according to manufacturer's specifications.

3.5 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection between tool/hose/compressor to prevent whipping in case of disconnection or failure (e.g. chains, tie wires, whip checks or equivalent retaining devices).

3.6 Safety clips or tool retainers must be in place on pneumatic impact tools to prevent accessories (e.g. chisel on a chipping hammer) or attachments from being ejected.

3.7 If an air hose is more than 1/2-inch (12.7 mm) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.

3.8 In general, the same precautions should be taken with an air hose that are recommended for electric cords, as the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards. Avoid creating trip hazards caused by hoses laid across walkways, curled underfoot, on ladders.

3.9 Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

3.10 Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.

3.11 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.

3.12 Use only the attachments that the manufacturer recommends for the tools in use.

3.13 Use the proper hose and fittings of the correct diameter and type for the pneumatic or hydraulic application.

3.13.1 The manufacturer’s recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

3.13.2 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.

3.13.3 Choose air supply hoses that have a minimum working pressure rating of 150 pounds per square inch gauge or 150 percent of the maximum pressure produced in the system, whichever is higher.

3.13.4 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.

3.14 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.

3.15 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.

3.16 Do not operate the tool at a pressure above the manufacturer's rating.

3.17 Turn off the air pressure to the hose, exhaust the airliine and disconnect the tool from the air supply when not in use, before servicing or when changing power tools or attachments.

3.18 Do not carry a pneumatic tool by its hose.

3.19 Do not use compressed air for cleaning purposes unless the pressure is reduced to 30 pounds per square inch (psi) or less. This rule does not apply for concrete form, mill scale, green cutting, and similar cleaning operations. Proper respiratory, hand, eye, and ear protection must be worn.

3.20 Compressed air guns shall never be pointed toward anyone.

3.20.1 Employees shall never “dead-end” them against themselves or anyone else.

3.20.2 A chip guard shall be used when compressed air is used for cleaning.

3.20.3 Never use compressed air to blow debris or to clean dirt from clothes or body.

4.0 Personal Protective Equipment

4.1 Gloves providing appropriate protection to the task (e.g. impact, puncture, chemical, etc.)

4.2 Safety toed boots

4.3 Use hearing protection, where required.

4.4 Wear safety glasses with side shields at all times and face shield if flying debris may be encountered.

Americas

Manual Hand Tools

S3AM-305-ATT15

1.0 General

1.1 Review manufacturer's operating manual and *S3AM-305-PR1 Hand & Power Tools* for additional guidelines.

1.2 Carry tools using a heavy belt or apron and hang tools at your sides.

1.3 Never carry tools in your pockets or hanging behind your back.

2.0 Hammers

2.1 Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.

2.2 Choose a hammer with a striking face diameter approximately ½ inch (1.3 centimeters) larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).

2.3 Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with beveled faces are less likely to chip or spall).

2.4 Look behind and above you before swinging the hammer.

2.5 Watch the object you are hitting.

2.6 Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.

2.7 Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head. Remove from service and replace the handle if possible.

2.8 Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.

2.9 Do not use a hammer for any purpose for which it was not designed or intended.

2.10 Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.

2.11 Do not redress, grind, weld or reheat-treat a hammer head.

2.12 Do not strike with the side or cheek of the hammer.

3.0 Pipe Cutters, Reamers, Taps and Threaders

3.1 Replace pipe cutter wheels which are nicked or otherwise damaged.

3.2 Use a three- or four-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.

3.3 Choose a cutting wheel suitable for cutting the type of pipe material required:

- 3.3.1 Thin wheel for cutting ordinary steel pipe.
- 3.3.2 Stout wheel for cutting cast iron.
- 3.3.3 Other wheels for cutting stainless steel, plastic and other materials.

3.4 Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75 percent as deep as the thread on the tap.

3.5 Use a proper tap wrench (with a "T" handle) for turning a tap.

3.6 Use lubricant or machine cutting fluid with metals other than cast iron.

3.7 Do not permit chips to clog flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning – this may result in the tap breaking if you continue to apply pressure.

3.8 Do not attempt to thread hardened steel. This can chip or damage the die.

3.9 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.

3.10 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

4.0 Pliers and Wire Cutters

4.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.

4.2 Choose pliers or wire cutters that have a grip span of 2½ – 3½ inches (6.4 – 8.9 centimeters) to prevent palm or fingers from being pinched when the tools are closed.

4.3 Use adjustable pliers that allow for a firm grip of the work piece while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).

4.4 Use tools only if they are in good condition.

4.4.1 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.

4.4.2 Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the work piece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.

4.5 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.

4.6 Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.

4.7 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.

4.8 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.

4.9 Do not expose pliers or wire cutters to excessive heat.

4.10 Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.

4.11 Do not use pliers as a hammer.

4.12 Do not hammer on pliers or wire cutters to cut wires or bolts.

4.13 Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.

4.14 Do not use cushion grip handles for jobs requiring tools with electrically insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.

4.15 Do not use pliers on nuts and bolts; use a wrench.

5.0 Screwdrivers

5.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.

5.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.

5.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.

5.4 For cross-head screws, use the correct size and type of screwdriver; a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozidriv screwdriver.

5.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.

5.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.

5.7 If work must be carried out on “live” electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.

5.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).

5.9 Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.

5.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.

5.11 Use a screwdriver that incorporates the following features when continuous work is needed:

5.11.1 Use a pistol grip to provide for a straighter wrist and better leverage.

5.11.2 Use a "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.

5.11.3 Use a ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.

5.12 File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.

5.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.

5.14 Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.

5.15 Do not hold the stock in one hand while using the screwdriver with the other as an injury may result if the screwdriver slips out of the slot.

5.16 Do not hammer screws that cannot be turned.

5.17 Do not grind the screwdriver tip to fit another size screw head.

5.18 Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-fluted spline screw heads).

5.19 Do not use defective screwdrivers (e.g. rounded or damaged edges or tips; split or broken handles; bent shafts).

5.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.

5.21 Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.

5.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.

5.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.

5.24 Do not carry screwdrivers in clothing pockets.

6.0 Snips

6.1 Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.

6.2 Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.

6.3 Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).

6.3.1 Universal snips can cut in both straight and wide curves.

6.3.2 Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.

6.3.3 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.

6.3.4 Aviation snips have compound leverage that reduces the effort required for cutting.

6.3.5 Offset snips have jaws that are set at an angle from the handle.

6.4 Use only snips that are sharp and in good condition.

6.5 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.

6.6 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.

6.7 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.

6.8 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.

6.9 Keep the nut and the pivot bolt properly adjusted at all times.

6.10 Oil the pivot bolt on the snips occasionally.

6.11 Do not try to cut sharp curves with straight cut snips.

6.12 Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.

6.13 Do not hammer or use your foot to exert extra pressure on the cutting edges.

6.14 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.

6.15 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

7.0 Wrenches

7.1 Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.

7.1.1 Do not use pipe wrenches on nuts and bolts.

7.1.2 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.

7.1.3 Do not use a conventional adjustable wrench for turning a tap – it will cause uneven pressure on the tap that may cause it to break.

7.1.4 Do not use a makeshift wrench.

7.2 Inspect pipe wrenches periodically for worn or unsafe parts and replace them:

7.2.1 Wrenches must not be used when jaws are sprung to the point that slippage occurs.

7.2.2 Ensure that the teeth of a pipe wrench are sharp, clean and free of oil and debris.

7.2.3 Do not use worn adjustable wrenches. Inspect the threads, knurl, jaw and pin for wear.

7.2.4 Discard any bent or damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).

7.3 Select the correct jaw size to avoid slippage.

7.3.1 Ensure that the jaw of an open-ended wrench is in full contact (fully seated, “flat,” not tilted) with the nut or bolt before applying pressure.

7.3.2 Face a pipe wrench or adjustable wrench “forward,” adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw. Do not pull on a wrench that is loosely adjusted.

7.3.3 Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.

7.3.4 Do not insert a shim in a wrench for better fit.

7.3.5 Before applying pressure, ensure that the jaws have a good bite.

7.3.6 Make sure adjustable wrenches do not "slide" open during use.

7.3.7 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length. Use a larger wrench as necessary.

7.4 Ensure that the pipe or fitting is clean to prevent unexpected slippage and possible injury.

7.5 Maintain a proper stance with feet firmly placed to maintain balance.

7.5.1 Position the body in a way that will prevent loss of balance and injury if the wrench slips or something (e.g., a bolt) suddenly breaks.

7.5.2 Pull, rather than push on the wrench handle as body balance is more likely to be maintained if the wrench slips.

7.5.3 Pull using a slow, steady pull; do not use fast, jerky movements.

7.6 Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.

7.7 Support the head of the ratchet wrench when socket extensions are used.

7.8 Stand aside when work is done with wrenches overhead.

7.9 Do not use a wrench on moving machinery.

7.10 Do not use the wrong tools for the job. For example: Do not use pliers instead of a wrench or a wrench as a hammer. Do not use pipe wrenches for lifting or bending pipes.

7.11 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.

7.12 Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

8.0 Files/Rasps

8.1 Do not use a file as a pry bar, hammer, screwdriver, or chisel.

8.2 When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.

8.3 Do not hammer on a file.

9.0 Chisels and Punches

9.1 Use the right size and type of chisel (metal or wood) or punch (drift pin, centre, pin) for the job.

9.2 Use tools only if they are good condition (i.e., cutting edges are sharp, struck head is not mushroomed or chipped).

9.2.1 Do not use chisels or punches if the cutting edge is dull, mushroomed or chipped, or if the point of a punch is slanted or damaged.

9.2.2 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel. Replace broken or splintered handles.

9.2.3 Redress striking tools with burred or mushroomed heads.

- Redress the point or cutting edge to its original shape.
- Do not use a grinder to redress heat-treated tools. Use a whetstone.
- Grind to a slightly convex cutting edge.
- The point angle of the chisel should be 70° for hard metals, 60° for soft.
- Do not apply too much pressure to the head when grinding a chisel. The heat generated can remove the temper. Immerse the chisel in cold water periodically when grinding.

9.2.4 Replace any chisel or punch that is bent, cracked, shows excessive wear or cannot successfully be redressed.

9.3 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling or punching.

9.4 Hold the chisel, for shearing and chipping, at an angle which permits the bevel of the cutting edge to lie flat against the shearing plane.

9.5 Use the appropriate type and size of hammer for the chisel or punch, such as:

9.5.1 A wooden or plastic mallet with a large striking face on chisels.

9.5.2 Heavy-duty or framing chisels made of a solid or molded handle can be struck with a steel hammer.

9.5.3 Ball-peen hammers are generally chosen for use with punches.

9.5.4 Refer to the ‘Hammers’ section of this document for further guidance.

9.6 Chip or cut away from the body. Keep hands and body behind the cutting edge.

9.7 Make finishing or paring cuts with hand pressure alone.

9.8 Provide hand protection if possible:

9.8.1 Use a sponge rubber shield, punch or chisel holder.

9.8.2 Clamp small work pieces in a vise and chip towards the stationary jaw when working with a chisel.

9.8.3 Do not allow bull point chisels to be hand-held by one employee and struck by another. Use tongs or a chisel holder to guide the chisel so that the holder's hand will not be injured.

9.9 Do not use cold chisels for cutting or splitting stone or concrete.

9.10 Do not use a drift pin punch (also called an aligning punch) as a pin punch intended for driving, removing, or loosening pins, keys, and rivets.

9.11 Do not use a wood chisel on metal.

9.12 Do not use a wood chisel as a pry or a wedge.

9.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.

9.14 Store chisels in a “storage roll,” a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.

10.0 Hacksaws

10.1 Select correct blade for material being cut.

10.2 Keep saw blades clean and lightly oiled using light machine oil on the blade to keep it from overheating and breaking.

10.3 Secure blade with the teeth pointing forward. Tighten the nut until the blade is under tension.

10.4 Keep blade rigid, and frame properly aligned.

10.5 Cut using steady strokes, directed away from you.

10.6 Use entire length of blade in each cutting stroke.

10.7 Cut harder materials more slowly than soft materials.

10.8 Clamp thin, flat pieces requiring edge cutting.

10.9 Do not apply too much pressure on the blade as the blade may break.

10.10 Do not twist when applying pressure.

10.11 Do not use when the blade becomes loose in the frame.

11.0 Vises

11.1 When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand, saw horse or box.

11.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.

11.3 Do not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.

11.4 Do not slip a pipe over the handle of a vise to gain extra leverage.

12.0 Clamps

12.1 Do not use a C-clamp for hoisting materials.

12.2 Do not use a C-clamp as a permanent fastening device.

13.0 Pry Bars

13.1 Establish balance and stable footing when using a bar for prying.

13.2 Pry bars must be appropriate to the task to prevent slipping or tool breakage.

14.0 Jacks

14.1 All jacks—including lever and ratchet jacks, screw jacks, and hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded.

14.2 The manufacturer’s load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.

14.3 A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.

14.4 To set up a jack, make certain of the following:

14.4.1 The base of the jack rests on a firm, level surface;

14.4.2 The jack is correctly centered;

14.4.3 The jack head bears against a level surface; and

14.4.4 The lift force is applied evenly.

14.5 Clear all tools, equipment and any other obstructions from under the load before lowering the jack.

14.6 Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule:

14.6.1 For jacks used continuously or intermittently at one site—inspected at least once every 6 months;

14.6.2 For jacks sent out of the shop for special work—inspected when sent out and inspected when returned; and

14.6.3 For jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.

Americas

Small Engines

S3AM-305-ATT16

1.0 Objective / Overview

1.1 Operate small engine machines (liquid fuel tools), such as push mowers, weed trimmers, pumps and leaf blowers, in a safe manner.

1.2 Workers must be trained and competent in the safe operation and maintenance of the tool.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Moving and sharp parts

2.4 Hot surfaces

3.0 Safe Operating Guidelines

3.1 Review *S3AM-305-PR1 Hand & Power Tools* and the manufacturer's operating manual for further guidance.

3.2 Do not wear loose or baggy clothing around tools with rotating parts.

3.3 Never run the engine indoors, in poorly ventilated areas, or in a location where the exhaust could be drawn into a building through an opening.

- 3.3.1 When an engine must be operated in an enclosed space, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.

3.4 Never store engine with fuel in fuel tank inside a building with potential sources of ignition such as hot water and space heaters, clothes dryers, electric motors, etc.

3.5 Ensure the fuel cap is in place. Never start or operate the engine with the fuel fill cap removed.

3.6 Refuelling:

- 3.6.1 Never remove fuel cap or add fuel when engine is running.
- 3.6.2 Shut down the engine and allow it to cool prior to refueling to prevent accidental ignition of hazardous vapors.
- 3.6.3 Never pour gasoline on hot surfaces.
- 3.6.4 Fill in well-ventilated area.
- 3.6.5 Do not re-fuel around an open flame or while smoking.

3.7 Use only properly labelled, American National Standards Institute/Canadian Standards Association-approved red gasoline containers to store and dispense fuel.

3.8 The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids.

3.9 Noise hazards associated with gasoline engines must be mitigated by the use of proper hearing protection. Ear plugs, ear muffs or a combination of the two must be used to protect workers from excessive noise levels.

3.10 Appropriate fire extinguishers must also be available in the area.

3.11 Do not pour fuel from engine or siphon fuel by mouth.

3.12 Never leave the engine unattended while it is running.

3.13 Never operate the engine with an unguarded engine shaft.

3.14 Do not modify the engine or tamper with the factory setting of the engine governor.

3.15 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.

3.16 Keep all flammable materials away from the muffler and the rest of the engine; do not idle or park the engine in dry grass or ground cover.

3.17 When working on the equipment, avoid accidental starts by removing the ignition key, turn off all engine switches, disconnect the battery and disconnect the spark plug, keeping it away from metal part.

4.0 Personal Protective Equipment

4.1 Always wear safety glasses with shields. Add face shield if potential for flying debris.

4.2 Gloves providing the appropriate protection (e.g. impact, abrasion, chemical, etc.).

4.3 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts. Long pants and long sleeve shirt.

4.4 Safety toe work boots.

4.5 Hearing protection (earmuffs or earplugs).

Americas

Electric & Battery Hand Tools

S3AM-305-ATT17

1.0 Objective / Overview

1.1 Electric and battery hand tools, also known as power tools, allow the user to perform their task more easily by providing more torque, speed, etc.

2.0 Hazards

2.1 Electricity

3.0 Safe Work Practices (General)

3.1 Review manufacturer's operating manual and *S3AM-305-PR1 Hand & Power Tools* for additional guidelines.

3.2 All electrical tools and equipment must be operated in accordance with the requirements of *S3AM-302-PR1 Electrical Safety.*

3.3 Keep all people not involved with the work at a safe distance from the work area.

3.4 Inspect power tools prior to each use.

- 3.4.1 Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.
- 3.4.2 Ensure that the tools are properly grounded using a three-prong plug (no loose or faulty prongs), are double insulated (and are labeled as such), or are powered by a low-voltage isolation transformer; this will protect users from an electrical shock.
- 3.4.3 Check the handle and body casing of the tool for cracks or other damage.
- 3.4.4 If the tool has auxiliary or double handles, check to see that they installed securely.
- 3.4.5 Inspect cords for defects: check the plug and power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- 3.4.6 Ensure power tool switches and triggers are fully functional.
- 3.4.7 If equipped with a trigger-lock, ensure it is disabled.
- 3.4.8 If a power tool is defective, remove it from service, and tag it clearly "Out of service for repair" or "Do Not Use". Replace damaged equipment immediately – do not use defective tools "temporarily." DO NOT ATTEMPT FIELD REPAIRS.

3.5 Maintain tools with care; keep them sharp and clean for best performance.

3.6 Follow instructions in the user's manual for lubricating and changing accessories.

3.7 Do not over-reach. Be sure to keep good footing and maintain good balance when operating power tools.

3.8 If they are available, choose tools with double handles to permit easier holding and better manipulation of the tool.

3.9 Do not brush away sawdust, shavings or turnings while the power tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.

3.10 Do not operate power tools that are not specified as intrinsically safe in an area containing explosive vapors or gases.

3.11 Do not clean tools with flammable or toxic solvents.

3.12 Do not surprise or touch anyone who is operating a power tool. Startling an operator could result in injury or

property damage.

3.13 Hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released.

3.13.1 Powered hand tools shall not be capable of being locked in the ON position. Trigger locks are not permitted.

3.13.2 All power tools should be ordered without trigger locks; if a tool is found with a trigger lock intact it must be disabled.

3.14 Avoid accidental starting. Do not hold fingers on the switch button, and ensure it is in the OFF position while plugging the tool in or while carrying an energized (plugged-in, battery in place) tool.

3.15 Do not leave a running tool unattended and ensure the power tool will not re-energize when not in use and when servicing, cleaning, making adjustments, applying flammable solutions or changing accessories:

3.15.1 Ensure it has stopped running completely.

3.15.2 Ensure the trigger or switch is OFF.

3.15.3 Ensure the power tool is disconnected from the power supply (unplugged or battery removed).

3.16 Operate power tools within their design limitations.

3.17 Store power tools, batteries and electrical cords in a clean, dry area off the ground when not in use.

3.18 Do not use power tools in damp or wet locations unless they are approved for that purpose.

3.19 Keep work areas well lighted when operating power tools.

3.20 Equipment must have proper guards or shields and they must remain in place to protect the operator and others from the following:

3.20.1 Point of operation.

3.20.2 In-running nip points.

3.20.3 Rotating parts.

3.20.4 Flying chips and sparks.

3.21 If a guard is removed to clean or repair parts, replace it before testing the equipment and returning the machine to service

3.22 If, due to damage or deterioration, the original guard provided on a piece of equipment cannot be put in place, the tool must be removed from service.

3.23 Do not modify, remove, or disable any machine guards.

3.24 Remove any wrenches and adjusting tools before turning on a tool.

3.25 Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.

4.0 Battery Powered Tools

4.1 Use only the type of battery specified by the tool manufacturer for the battery-powered tool to be used.

4.2 Recharge a battery or battery-powered tool only with a charger that specified for the battery.

4.3 Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting out the battery and possibly cause sparks, fires or burns.

5.0 Safe Work Practice (Electric)

5.1 During use, keep power cords clear of tools and the path that the tool will take.

5.2 Employees' hands shall not be wet when plugging and unplugging cord and plug connected equipment and extension cords.

5.3 Portable electric equipment shall be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.

5.4 Portable electric equipment and extension cords used in potentially wet locations shall be approved for use in those locations by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation (e.g., F.M., UL, etc.).

5.5 The outlet box for portable extension cords for outdoor use shall be weatherproof and shall be maintained in good condition.

5.6 Maintain electrical cords and connections in good working order:

5.6.1 Cords and connection must be American National Standards Institute/Canadian Standards Association approved and bear a standardized certification marking (e.g., CSA, ANSI, UL, CE etc.).

5.6.2 To prevent overheating, use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool to be used.

- Do not connect or splice extension cords together to make a longer connection.
- For outdoor work, use outdoor extension cords marked “W-A” or “W.”

5.6.3 Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.

5.6.4 Portable electrical equipment shall not be carried by the cord, nor raised or lowered by the cord.

5.6.5 Electrical cords shall not be removed from a receptacle by pulling on the cord line.

5.6.6 Cords shall not be placed across walkways unless appropriate cord and worker protection is in place to prevent damage to the cord and worker tripping hazards (e.g. cable protectors, cords suspended over walkway, etc.).

5.6.7 Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.

5.6.8 A cord should not be pulled or dragged over nails, hooks, or other sharp objects that may cause cuts in the insulation.

5.6.9 Keep cords away from heat, oil, sharp edges and moving parts.

5.6.10 Never use extension cords as permanent wiring as they are for temporary use only. Do not run behind bookshelves, or furniture if the cord cannot be monitored for severe bending or damage.

5.6.11 Inspect cords frequently for such damage such as fraying, kinks, cuts, and cracked or broken outer jackets. Any cord that exhibits damage or feels more than comfortably warm to the touch shall be removed from service, tagged “Do Not Use’ and checked by an electrician.

5.6.12 Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.

5.7 Electrical shock associated with power tool use can cause heart failure and burns, as well as injury from falls. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death.

5.7.1 Verify that the power source is the same voltage and current as indicated on the nameplate of the tool. Using a higher voltage can cause serious injury to the operator as well as burn out the tool.

5.7.2 All electrical connections for these tools must be suitable for the type of tool and the working

conditions (wet, dusty, flammable vapors).

5.7.3 To protect the worker from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer.

5.7.4 All outdoor receptacles must be protected by means of a ground fault circuit interrupter (GFCI or GFI) available in portable or fixed models. Do not use any electric power tools outdoors in a receptacle that is not properly protected.

5.7.5 Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground.

5.7.6 The third prong must never be removed from the plug.

5.7.7 Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

5.7.8 Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.

5.7.9 Report all shocks and/or sparks from electrical tools, no matter how minor. The tool in question should be tagged out and not be used until it has been checked for ground fault.

5.8 Only authorized persons are permitted to activate, de-activate or lockout electrical equipment.

5.9 Where there is or may be a danger to a worker, from the inadvertent operation of electrical equipment, then that equipment must be locked out and tagged prior to commencing work. Refer to *S3AM-325-PR1 Lockout Tagout*.

5.9.1 Switch off all appropriate devices (MCC, Distribution Panel, Disconnect).

- Stand to one side when engaging or disengaging an electrical circuit breaker to avoid electrical flash backs Lock and tag Electrical Supply devices in the “OFF” position.

5.9.2 Test to be sure the equipment cannot be operated at the STOP-START switch.

5.9.3 Test to be sure electrical equipment is de-energized.

5.9.4 After completion of task, remove padlocks and destroy tags.

6.0 Personal Protective Equipment (Level D PPE)

6.1 Wear proper apparel for the task. Long hair, loose or baggy clothing, ties, or jewellery can become caught in moving parts.

6.2 Use gloves with protection appropriate to the task (e.g. impact, abrasion, puncture, etc.).

6.3 Safety toed boots.

6.4 Use hearing protection as necessary.

6.5 Kickback aprons as necessary.

6.6 Wear safety glasses with side shields at all times (or safety goggles) and face shield if flying debris may be encountered.

7.0 Belt Sanders

7.1 Refer to *S3AM-305-ATT11 Sanders.*

8.0 Drills

8.1 Refer to *S3AM-305-ATT8 Power Drill*.

9.0 Planers and Joiners

9.1 Use blades of the same weight and set at the same height.

9.2 Ensure that the blade-locking screws are tight.

9.3 Guard planers and joiners to prevent contact with the blades throughout the full length of the cutting area.

9.4 Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.

9.5 Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.

9.6 Start a cut with the infeed table (front shoe) resting firmly on the stock and with the cutter head slightly behind the edge of the stock.

9.7 Use two hands to operate a planer - one hand on the trigger switch and the other on a front handle.

9.8 Do not put fingers or any object in a deflector to clean out chips while a planer is running.

9.9 Disconnect the power supply when stopping to dump out chips.

9.10 Do not set a planer down until blades have stopped turning.

9.11 Keep all cords clear of cutting area.

10.0 Routers

10.1 Ensure that the bit is securely mounted in the chuck and the base is tight.

10.2 Put the base of the router on the work, template or guide. Make sure that the bit can rotate freely before switching on the motor.

10.3 Secure stock. Never hold or have another individual hold the material. Sudden torque or kickback from the router can cause damage and injury.

10.4 Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.

10.5 Keep all cords clear of cutting area.

10.6 Always hold both hands on router handles, until a motor has stopped. Do not set the router down until the exposed router bit has stopped turning.

10.7 When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower the bit to two times the required depth.

10.8 When routing outside edges, guide the router counter clockwise around the work.

10.9 When routing bevels, moldings and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.

10.10 Feed the router bit into the material at a firm, controlled speed.

10.11 Softwood may enable fast router cutting speed. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.

10.12 The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise.

10.13 When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.

10.14 To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

11.0 Circular Saws

11.1 Refer to *S3AM-305-ATT2 Circular Saw*.

12.0 Other Saws

12.1 Use lubricants when cutting metals.

12.2 Keep all cords clear of cutting area.

12.3 Cut green or wet material slowly and with caution. Check all material being cut for nails, hard knots, etc.

12.4 Make sure guards are installed and are working properly.

12.4.1 Table saws must be fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.

- Exposed parts of the saw blade under the table must be properly guarded.
- All swing cutoff and radial saws that are drawn across a table with limit stops to prevent the saw from traveling beyond the edge of the table

12.4.2 Ensure band saw blades are fully enclosed except at the point of operation.

12.4.3 Ensure swing cut-off saws have a guard completely covering the upper half of the saw.

12.5 Remember sabre saws cut on the upstroke.

12.6 Position the saw beside the material before cutting and avoid entering the cut with a moving blade.

12.7 Secure and support stock as close as possible to the cutting line to avoid vibration.

12.7.1 Hold the material being cut firmly against a back guide or fence and cut with a single, steady pass.

12.7.2 Use a push stick or guide when cutting operation requires the hands of the operator to come close to the blade.

12.7.3 When cutting long stock, provide extension tables and a helper to assist the operator.

12.7.4 Keep the base or shoe of the saw in firm contact with the stock being cut.

12.7.5 Automatic feed devices should be used whenever feasible.

12.8 Select the correct blade for the material being cut and allow it to cut steadily. Do not force it. Clean and sharp blades operate best.

12.9 Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.

12.10 Do not start cutting until the saw reaches its full power.

12.11 Do not force a saw along or around a curve. Allow the machine to turn with ease.

12.12 Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.

12.13 Do not put down a saw until the motor has stopped.

12.14 Do not reach under or around the stock being cut.

12.15 Maintain control of the saw always. Avoid cutting above shoulder height.

12.16 External Cuts

12.16.1 Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.

12.16.2 Hold the saw firmly down against the material and switch the saw on.

12.16.3 Feed the blade slowly into the stock, maintaining an even forward pressure.

12.17 Internal Cuts

12.17.1 Drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade in the hole until the shoe rests firmly on the stock.

12.17.2 Do not let the blade touch the stock until the saw has been switched on.

Americas

Hand & Power Tool Maintenance Inventory

S3AM-305-FM1

Equipment (*Make, Model, Serial #*)	Equipment Owner	Equipment Status (*On Hire, Active, Decommissioned*)	Frequency of service	Service Type	Manufacturer's Standards	Industry Standards	Legislated Requirements	Location of Equipment

Americas

Hand & Power Tool Inspection Report

S3AM-305-FM2

TOOL	DATE	INSPECTED BY	RESULTS	ACTION REQUIRED	ACTION COMPLETED (DATE)

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content where the potential for hand injuries is present.

1.2 This procedure is intended to protect employees from activities that may expose them to hand injury. This procedure provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

1.3 All personnel shall have gloves in their immediate possession 100% of the time when in a shop or on a work site. Appropriate gloves shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-208-PR1 – Personal Protective Equipment

3.3 S3AM-209-PR1 – Risk Assessment & Management

3.4 S3AM-325-PR1 – Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Implementation of this standard for the applicable facility, site, or project location.
- Confirm employees are familiar with this procedure and have appropriate training.
- Confirm the appropriate hand protection is available on site as necessary.

4.1.2 **Employees**

- Recognize hazards to hands.
- Comply with this procedure as well as client or work location requirements.

4.1.3 **SH&E Manager**

- Advise supervisors and site personnel on matters relating to hand safety.
- Work with the manager / supervisor to confirm that sufficient PPE and equipment are available.
- Maintain contact with manager / supervisor to regularly evaluate site conditions and new information that might require modifications to this procedure.
- Conduct training or briefings, when necessary, and to explain the content of this procedure and site hazards to employees.

- Assist in investigation of incidents that resulted or could have resulted in an injury.

4.2 Hazard Assessment

4.2.1 Perform hazard assessments for those work activities likely to require Personal Protective Equipment (PPE).

- Use the Task Hazard Assessment (THA) to perform the hazard assessment (in accordance with *S3AM-209-PR1 Risk Assessment & Management*). The THA will accompany AECOM personnel at jobsites for use in the event of a job or task change, or
- Use the *Gloves Needs Assessment – S3AM-317-FM1* or equivalent to perform the assessment.
- Re-evaluate completed hazard assessments when the job or task changes.

4.2.2 The hierarchy of controls should be considered during the THA process to minimize or eliminate the need for hand protection PPE or material handling tools. Examples of controls are chemical substitution, machine guarding, and use of different tools.

4.2.3 Select PPE that will protect employees if hazards cannot be eliminated.

- Review Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with a SH&E Manager for assistance.
- Review glove manufacturer recommendations for both physical and chemical protection.
- Obtain gloves of the correct size for the employees.
- When both chemical and physical protection is of concern, wear the chemical protection gloves (e.g., nitrile) inside the physical protection gloves (e.g., leather, Kevlar®).
- Nitrile gloves or equivalent chemical resistant shall always be used for protection from hazardous fluids or non-corrosive chemicals.
- Do not wear metal or metal-reinforced gloves when working with electrical equipment or on electrical services. Proper leather and/or rubber gloves designed and tested for this purpose shall be used.
- Refer to *S3AM-208-PR1 – Personal Protective Equipment* for additional information.

4.2.4 Follow glove requirements in the applicable SH&E plan.

4.3 Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)

4.3.1 General

- As applicable, employees shall be trained in the use of all tools. Refer to *S3AM-003-PR1 SH&E Training*.
- Keep hand and power tools in good repair and use them only for the task for which they were designed.
- Inspect tools before use and remove damaged or defective tools from service.
- Operate tools in accordance with manufacturer's instructions.
- Do not remove or bypass a guarding device for any reason.
- Keep surfaces and handles clean and free of excess oil to prevent slipping.
- Do not carry sharp tools in pockets.
- Clean tools and return to the toolbox or storage area upon completion of a job.

- Confirm that the wrench is in full contact (fully seated, "flat", not tilted) with the nut or bolt before applying pressure.
    - Place the body in the proper position for optimal balance and bracing to prevent falls if the tool slips.
    - Make sure hands and fingers have sufficient clearance in the event the tool slips.
    - Whenever possible, pull on a wrench and avoid pushing.
- When working with tools overhead, place tools in a holding receptacle when not in use.
- Do not throw tools from place to place or from person to person, or drop tools from heights.
- Inspect all tools prior to start-up or use to identify any defects.
- Powered hand tools shall not be capable of being locked in the ON position.
- Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
- Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools or rotating equipment.
- Do not increase the leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.
- Make provisions to prevent machines from restarting through proper lockout/tagout (refer to *S3AM-325-PR1 – Lockout Tagout*).

4.3.2 Cutting Tools

- Always use the specific tool designed for the task. Tubing cutters, snips, self-retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see *S3AM-317-ATT1 Safe Alternative Tools.*
- Fixed open-blade knives (FOBK) are prohibited from use during the course of AECOM work.
    - Examples of fixed open-blade knives include pocket knives, multi-tools, hunting knives, and standard utility knives.
    - Any exception to this requirement shall require approval of the Manager / Supervisor and SH&E Manager.
- When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
    - Use the correct tool and correct size tool for the job.
    - Cut in a direction away from yourself and not toward other workers in the area.
    - Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
    - Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
    - Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
    - On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
    - Do not remove guards on paper cutters.
    - In office locations, paper cutters must always be kept in a locked position when not in use.

4.3.3 Moving/Rotating Equipment

- General Requirements for Rotating Equipment (feed augers, chippers, conveyors, etc.)

- Never place hands, fingers, or extremities near hoppers and operational areas of machinery.
- When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.
- Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, locked out, and the moving parts of the equipment have stopped rotating. Refer to *S3AM-325-PR1 – Lockout Tagout*.

4.3.4 Other Physical Hazards

- Activities such as drum handling, fencing, work near razor wire, manhole cover removal, and demolition also pose hazards to hands. Use tools instead of hands for high hazard tasks whenever possible.
- Plan work to avoid pinch points for hands when moving drums, moving manhole covers into position, and handling other heavy objects.
- Work handling scrap metal, glass or other sharp edges requires proper hand PPE (Kevlar® or leather gloves).
- Activities involving hoisting, lifting and landing of a load shall be done "hands-free" when possible. Refer to *S3AM-317-ATT2 – Safe Hands-Free Lifting Guidelines*.

4.4 Ergonomics – Hand and Wrist Care

4.4.1 Keep your wrist in neutral. Avoid using your wrist in a bent (flexed), extended, or twisted position for long periods of time. Instead try to maintain a neutral (straight) wrist position. Ergonomic tools may be needed for long-term work.

4.4.2 Watch your grip. Gripping, grasping, or lifting with the thumb and index finger can put stress on your wrist. When practical, use the whole hand and all the fingers to grasp an object.

4.4.3 Minimize repetition. Even simple, light tasks may eventually cause injury. If possible, avoid repetitive movements or holding an object in the same way for extended periods of time.

4.4.4 Reduce speed and force. Reducing the speed with which you do a forceful, repetitive movement gives your wrist time to recover from the effort. Using power tools helps reduce the force.

4.4.5 Rest your hands. Periodically give your hands a break by letting them rest briefly. Or you may be able to alternate easy and hard tasks, switch hands, or rotate work activities.

4.4.6 Consider low vibration or anti- vibration hand power tools when possible.

4.5 Cleaning Hands

4.5.1 Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.

4.5.2 Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.

4.5.3 If the hands contact a corrosive (e.g., nitric acid), wash the area with water for fifteen minutes and then seek medical attention.

4.5.4 Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.

4.5.5 In some cases barrier creams may be used to provide limited protection for hands exposed to greases and oils.

4.6 Safe Hands Observation Tool

4.6.1 The *Safe Hand Task Review Card S3AM-317-FM2* may be used to supplement and reinforce safe work practices and the requirements of this procedure.

4.6.2 The observer's responsibilities include:

- Two-way conversation with the employees being observed.
- Completing the card and mark the applicable fields on the back of the card.
- Submitting the completed cards to the supervisor.

4.6.3 The supervisor's responsibilities include:

- Reviewing the completed cards.
- Identifying best work practices and any improvements.
- Communicating any changes back the employee(s).

5.0 Records

The following documentation will be maintained:

5.1 Hand tool training records, as applicable.

6.0 Attachments

6.1 S3AM-317-FM1 Glove Needs Assessment

6.2 S3AM-317-FM2 Safe Hands Task Review Card

6.3 S3AM-317-ATT1 Safe Alternative Tools

6.4 S3AM-317-ATT2 Safe Hands-Free Lifting Guidelines

Americas

Glove Needs Assessment

S3AM-317-FM1

Mgr. / Supervisor Name: Work Area Name:

Task/Operation Being Evaluated: Date:

1.0 Using the Protection and Performance Needs Assessment Table Below

1.1 Function and performance needs must be evaluated thoroughly. If employees have a strong need for dexterity, tactility, and/or grip this should be identified as a priority. Rank properties in the table below with 1 being the highest priority. Do not assign the same priority more than once. It is only necessary to rank the applicable properties. If all properties are ranked, the lowest priority would be ranked 12.

Protection and Performance Needs Assessment			
Category	**Properties**	**Protection and Performance Needs**	**Priority** (1=Top Priority)
Mechanical	Cut Resistance	Protection from sharp edges, blades, and other cutting hazards	
	Puncture Resistance	Protection from sharp objects like nails, pins, needles, wire	
	Abrasion Resistance	Durability and resistance to abrasive objects or materials	
	Shielding	Protection from impact, ricochet, small projectiles.	
Chemical	Degradation & Absorption Resistance	Durability and resistance to breaking down and/or permeating the glove from exposure to chemicals. Refer to the chemical's Safety Data Sheet for the appropriate glove choice.	
Thermal	Heat Resistance	Thermal protection from hot objects or materials	
	Cold Resistance	Thermal protection from cold weather, objects, or materials	
Vibration	Anti-Vibration	Vibration reduction from operating certain tools and equipment	
Electrical	Insulation	If performing work on electrical equipment, this must be the top priority	
Function	Dexterity	Ability to manipulate objects and control hands in the desired manner	
	Tactility	Ability to sense objects by touch	
	Grip	Ability to exert pressure on an object when holding it	

1.2 Identify a glove that meets the top protection and performance priorities.

In most cases there are trade-offs between hazard protection and functional performance of a glove. These factors are equally important. The higher the severity of the hazard, the more important hazard protection is. The table below offers additional guidance on key considerations when selecting a glove for certain protection and performance properties.

<table>
<tr><th>Category</th><th>Properties</th><th>Key Considerations and Selection Criteria</th></tr>
<tr><td rowspan="4">Mechanical</td><td>Cut Resistance</td><td>Testing Standard: ASTM F1790 and ASTM F1970-05
There are 5 levels of cut resistance. 5 is the highest.</td></tr>
<tr><td>Puncture Resistance</td><td>Testing Standard: EN 388:2003
This testing measures the force required to pierce the sample with a standard sized point.</td></tr>
<tr><td>Abrasion Resistance</td><td>Testing Standard: ASTM D3389-05 and ASTM D3884-09
Abrasion resistance testing measures how well the glove material resists loss of material from rubbing on rough surfaces.</td></tr>
<tr><td>Shielding</td><td>Some gloves offer thick padding or hard guards around the back of the hand or knuckles. These can offer good protection against impact.</td></tr>
<tr><td>Chemical</td><td>Degradation & Absorption Resistance</td><td>Identify products / chemicals that present potential exposures. Refer to the chemical’s Safety Data Sheet and glove manufacturer’s specifications for the appropriate glove choice.</td></tr>
<tr><td rowspan="2">Thermal</td><td>Heat Resistance</td><td>Testing Standard: ASTM F1060-08
This testing measures the insulation provided by the glove when contacting a hot surface. Higher temperatures reported indicate a glove with greater insulation.</td></tr>
<tr><td>Cold Resistance</td><td>Testing Standard: EN 511:1994 (for ambient temperature)
Testing Standard: ISO 5085:1989-1 (for cold surfaces)
Choosing the right glove depends on whether protection is needed from cold weather or cold surfaces.</td></tr>
<tr><td>Vibration</td><td>Anti-Vibration</td><td>Testing Standard: ANSI S2.73-2002 (R2007)
This testing method measures the vibration transmission of the glove.</td></tr>
<tr><td>Electrical</td><td>Insulation</td><td>Testing Standard: ASTM D120-09
Glove protection depends on the maximum voltage of energized components.
<table>
<tr><td>50 – 480V</td><td>Class 00 with Leather Protectors</td></tr>
<tr><td>480 – 600V</td><td>Class 0 with Leather Protectors</td></tr>
<tr><td>600V and above</td><td>Class 0 or higher (depending on maximum voltage) with Leather Protectors</td></tr>
</table></td></tr>
<tr><td rowspan="3">Function</td><td>Dexterity</td><td>Testing Method: EN 420:2003
Ability to manipulate objects and control hands in the desired manner. This testing method assesses the wearer’s ability to pick up small diameter pins lying on a flat surface with their thumb and forefinger.
If high dexterity is needed, and the hazards are relatively low to the forefinger and thumb, consider a glove that is tip less for those two digits.</td></tr>
<tr><td>Tactility</td><td>Ability to sense objects by touch. There is no standard test. However, a common field test is to determine if the wearer can feel a pulse while wearing the glove. This is affected by the thickness of the glove, presence of liners, glove surface characteristics, and properties of the coating material.</td></tr>
<tr><td>Grip</td><td>Testing Standard: NFPA 1971 (Grip)
Ability to exert pressure on an object when holding it.</td></tr>
</table>

Safe Hands Task Review Card

Task Being Performed: _____

Date: _____

Person Performing Task Review: _____

Pre-Job: Did Employees identify/discuss?

- ○ Placement of hands
- ○ Potential hazards to the hands (sharp edges, chemicals, etc.)
- ○ Actions to eliminate exposure to hands
- ○Type of gloves or other PPE to protect hands

Safe Hands Task Review Card

Task Being Performed: _____

Date: _____

Person Performing Task Review: _____

Pre-Job: Did Employees identify/discuss?

- ○ Placement of hands
- ○ Potential hazards to the hands (sharp edges, chemicals, etc.)
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- ○Type of gloves or other PPE to protect hands

Safe Hands Task Review Card (S3AM-317-FM2)
Revision 0 March 1, 2016

Go To Back of Card

Safe Hands Task Review Card

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Date: _____

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Safe Hands Task Review Card (S3AM-317-FM2)
Revision 0 March 1, 2016

Go To Back of Card

Task: _____

Are employees hands placed near hazard areas?

○ Sharp Edges ○ Crush Hazards ○ Pinch Points ○ Chemicals

Could other tools or controls be used to prevent hand from being in the hazard zone?

○ Block Materials ○ Cover Sharp Edges

○ Are tools used to keep hands clear of pinch/crush hazards

Are the gloves being used appropriate for the task?

○ Do they offer the right type of protection from the identified hazards?

○ Do they have enough dexterity to complete the task while worn?

Is the off-hand placed away from the hazard zone?

○ Yes ○ No

Are there any other actions that could have been taken to keep hands safe?

_____

Task: _____

Are employees hands placed near hazard areas?

○ Sharp Edges ○ Crush Hazards ○ Pinch Points ○ Chemicals

Could other tools or controls be used to prevent hand from being in the hazard zone?

○ Block Materials ○ Cover Sharp Edges

○ Are tools used to keep hands clear of pinch/crush hazards

Are the gloves being used appropriate for the task?

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○ Yes ○ No

Are there any other actions that could have been taken to keep hands safe?

_____

Task: _____

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○ Do they have enough dexterity to complete the task while worn?

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○ Yes ○ No

Are there any other actions that could have been taken to keep hands safe?

_____

Task: _____

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Are the gloves being used appropriate for the task?

○ Do they offer the right type of protection from the identified hazards?

○ Do they have enough dexterity to complete the task while worn?

Is the off-hand placed away from the hazard zone?

○ Yes ○ No

Are there any other actions that could have been taken to keep hands safe?

_____

1.0 Types of Safety Knives or Alternative Cutting Tools

1.1 Self-retracting utility knives (brands – OLFA, Martor, Allway Tools)



1.2 Guarded utility knives (brands – The Safety Knife Co., Martor)





1.3 Shears, snips, scissors (brands – Ridgid, Craftsman, Wolfcraft)





1.4 Concealed blade cutters (brands – The Safety Knife Co., Martor)







1.5 Pipe cutters (brands – Ridgid, Empire)







1.6 Specialty cutter (brand – Geoprobe)



Americas

Safe Hands-Free Lifting Guidelines

S3AM-317-ATT2

1.0 What is Safe Hands Free Lifting?

The Task Hazard Assessment (THA) shall identify the measures taken to prevent injuries to hands, including methods to perform hands-free lifting as well as address proper glove selection. The most hazardous parts of a lifting operation are hoisting and landing of the load. Therefore at these critical stages, personnel must be as far away from the load as possible in case the load shifts or drops. To ensure this happens, it is essential to adopt a "hands-free" lifting guideline that is rigidly followed.

Once a load is properly rigged and connected to a mechanical lifting device, personnel should not handle or touch a load or rigging with any part of their body as the load is being lifted or before the load is properly set down, and all potential energy is released.

However, there will always be certain jobs which will require "hands-on" for final positioning. These should be treated as exceptions to the norm and fully addressed in the risk assessment process with special attention given to the risk of injury to fingers, hands, toes and feet.

2.0 Objective of Safe Hands Free Lifting

To eliminate the risk of injury to personnel from pinch points, caught between zones, entanglement hazards and a reduced field of vision.

3.0 What are the benefits of Safe Hands Free Lifting?

- Significantly reduces crush, entanglement and hand injuries.
- Clears you of the potential injury zone for dropped objects.
- Clears you of the potential swing area.
- Personnel can see more of the load zone.
- Better posture when pushing and pulling objects.
- Less strain on the lower back and neck area.
- Creates a strong safety culture for all project personnel.

4.0 Can every load be guided with Safe Hands Free Lifting?

4.1 MOSTLY, but there *may* be times when due to restricted work space, working from elevated work platforms, awkward angles and body posture, that hands will need to be used.

4.2 HOWEVER, every load must be assessed in real time as part of the Safe Work Planning process. Remember to document and communicate the process to be used with all involved employees.

5.0 How is Safe Hands Free Lifting Achieved?

5.1 The Correct Mindset

Changing the way we have done things for years always results in an element of "pushback" from people set in their ways. We have to persevere with fresh ideas or we will never change things for the better. It is a natural reaction to hold the rigging in place until the tension is taken up to make sure the load is properly slung and balanced. Nevertheless, how often have you heard of people getting hands, fingers and body pinched, trapped or crushed by the rigging?

5.2 Tag Lines

Tag lines must be attached to a load prior to lifting and provided at the appropriate length to allow employees to stay clear of the drop zone and any pinch/crush points the load may create.

Whether or not to use tag lines has always been a debatable point, but the consensus of opinion is that although their use can introduce additional hazards, their use generally increases the safety of the lift. Having said that, the advantages and disadvantages will be considered and their use determined during the risk assessment and documented.

5.3 Push / Pull Sticks

Push / Pull sticks are simply wooden or fiber glass poles with a boat hook at one end and a rubber or leather pad at the other. Ideally, these should be about 2 meters / 6 feet long. Their primary use is to retrieve tag lines hanging vertically down from the load so that personnel do not have to get too close to the suspended load. Their secondary use is to push and maneuver loads into the correct orientation / position for landing or guiding them into tight spaces while remaining hands-free / hands-off.

Achieving “hands-free” lifting is not difficult; it is an awareness of the hazards and planning the work and working the plan. If you do come up against jobs that appear to require “hands-on”, think long and hard about how you can change that and if you think it needs special tools or equipment to achieve “hands-free”.

6.0 What has to happen if you put your hands on the load?

- Safe Work Planning.
- Use proper gloves.
- Agree on the communication method within the lift group.
- Never touch the load with your arm higher than your shoulder level.
- Use hooks to pull tag lines away from the drop zone.
- Keep out of the drop zone.
- Look ahead for the pinch points and crush zones.

7.0 Mandatory Safe Hand Practices

- All personnel must have GLOVES in possession 100% of the time.
- Appropriate GLOVES shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.
- All Hoisted Loads should only be touched with a HANDS FREE TOOL.
- DO NOT place any part of your body under a suspended load.

8.0 Guidelines for Safe Hands-Free Lifting are in addition to any requirements of S3AM-317-PR1 Hand Safety

8.1 Safe Hands Free Lifting Tools



- Rubber dipped or vinyl coated tag lines prevent curling of rope.
- Eliminates trip and entanglement hazards.

- Example of aluminum boat hook modified for Safe Hands Free Lifting.
- One end rubberized for controlled pushing.
- Hook ideal for pulling tag lines to you and not walking into the drop zone.



- Other tool options for Safe Hands Free Lifting



8.2 Photo Examples







Americas

Hazardous Waste Operations

S3AM-117-PR1

1.0 Purpose and Scope

1.1 Provides requirements for AECOM operations pertaining to hazardous waste and emergency response (HAZWOPER) services. In Canada and South America, there is no direct counterpart to HAZWOPER; however, as due diligence and in compliance with applicable duty of care/general duty clauses, staff working in Canada and South America will comply with this procedure as far as it aligns with the location's respective legislation.

1.2 Provides a procedure intended to address small incidental spills from work related equipment and supplies. For operations with bulk quantities of fuels, chemicals, oils, and for operations where AECOM is providing emergency response services for spills, the SH&E Manager or designee shall specify spill prevention and preparedness criteria including training, equipment, and proficiency.

1.3 To define appropriate procedures to decontaminate both equipment and personnel when exposure to hazardous chemicals or physical agents has occurred.

1.4 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Contamination Reduction Zone (CRZ)** – The transition area between the contaminated area and the clean area where decontamination activities occur.

2.2 **Decontamination** – The process of removing or neutralizing contaminants that have accumulated on personnel or equipment.

2.3 **Emergency Response** – A response effort by employees from outside the immediate release area or by other designated responders (e.g.., mutual-aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrollable release of a hazardous substance or whenever a release requires that a federal, state, territorial or provincial agency be notified, such as:

- A release at or above a reportable quantity (RQ) of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance (40 CFR 302.8) is required to be reported to the National Response Center (NRC).
- A release at or above provincial reporting thresholds, if any, or alternatively those specified under the Canadian Transportation of Dangerous Goods Act are reportable under the Canadian Environmental Protection to the respective provincial or territorial Environmental Regulatory Agency .
- A hazardous chemical release at or above an RQ under the Emergency Planning and Community Right-to-Know Act (EPCRA) (Title III under the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 350-372) is required to be reported to state and local officials.
- A release in violation of a facilities Spill Prevention, Control, and Countermeasure (SPCC) Plan (40 CFR 112).

Responses to incidental release of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by maintenance personnel are not considered to be emergency responses within the scope of the HAZWOPER standard. Responses to releases of hazardous substances where there is no potential safety or health hazard are not considered to be emergency responses.

2.4 **Exclusion Zone (EZ)** – The area where contamination does or could occur.

2.5 **First Responder** – First responders are individuals who are likely to witness or discover a hazardous substance release, injury, fire, or other incident and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond first aid, initial control of the incident, and notifying the authorities and others of the incident.

2.6 **Hazardous Materials** – A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Additionally a hazardous material may be defined as any substance or chemical which is a "health hazard" or "physical hazard," including chemicals that are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents that act on the hematopoietic system; agents that damage the lungs, skin, eyes, or mucous membranes; chemicals that are combustible, explosive, flammable, oxidizers, pyrophoric, unstable-reactive, or water-reactive; and chemicals that in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapor, mists, or smoke that may have any of the previously mentioned characteristics. This may be caused when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing into the environment, by being transported or moved, and items or chemicals that are "special nuclear source" or by-product materials or radioactive substances.

2.7 **Hazardous Materials Specialist** – Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities in regards to site activities.

2.8 **Hazardous Materials Technician** – Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

2.9 **Hazardous Waste** – Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludge. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes. Hazardous waste are divided into:

- Listed wastes (http://www.epa.gov/osw/hazard/wastetypes/listed.htm);
- Characteristic wastes (http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm);
- Universal wastes (http://www.epa.gov/osw/hazard/wastetypes/universal/index.htmwastes); and
- Mixed wastes;
- Specific procedures determine how waste is identified (http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm), classified, listed, and delisted.

2.10 **Health and Safety Plan (SH&E PLAN)** – A document prepared for each project that contains site-specific information including the Emergency Response Plan for the project.

2.11 **Incidental Releases** - A response to a spill or release of a hazardous substance (in quantities below its RQ) where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area using equipment and materials available to them at the time or the spill or release. Any spill or release that cannot be managed with the personnel, materials, and equipment at the site shall be considered an Emergency Response.

- Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses. Handling of incidental releases shall be in accordance with applicable standard operating procedures.

2.12 **Incident Command System (ICS)** – ICS is a standardized on-scene incident management concept designed specifically to allow responders to adopt an integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries. In the ICS the first person responding to an incident becomes the Incident Commander and turns that title and duties over to more qualified responders as they arrive on scene.

2.13 **Incident Commander** – The Incident Commander (IC) is responsible for all aspects of the response, including developing incident objectives and managing all incident operations. The title and responsibilities are typically assumed by a qualified IC from the client or public sector.

2.14 **Support Zone (SZ)** – An uncontaminated zone where administrative and other support functions (e.g. first aid, equipment supply, emergency information, etc.) are located.

3.0 References

3.1 SR1-003-WI2 Disruptive Event Response Instruction

3.2 S3AM-003-PR1 SH&E Training

3.3 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.4 S3AM-010-PR1 Emergency Response Planning

3.5 S3AM-012-PR1 First Aid

3.6 S3AM-017-PR1 Injury & Illness Recordkeeping

3.7 S3AM-127-PR1 Exposure Monitoring

3.8 S3AM-128-PR1 Medical Screening & Surveillance

3.9 S3AM-208-PR1 Personal Protective Equipment

3.10 S3AM-209-PR1 Risk Assessment & Management

3.11 S3AM-213-PR1 Subcontractor Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Enforces and supports the implementation of SH&E Plans, Location Specific Emergency Response Plans, and Spill Response Plans;
- Prepare or request a SH&E Plan for every AECOM project with Hazardous Waste Operations and Emergency Response Activities, refer to *S3AM-209-PR1 Risk Assessment & Management*;
- Verify that all personnel working on the project are qualified to perform the activities they are assigned (see HAZWOPER and Emergency Spill Response Training requirements below);
- Request client's emergency response procedures;
- Appoint a Site Safety Officer (SSO) with appropriate qualifications for the specific hazardous waste project;
- Confirm that the SSO for complex projects, such as those with complicated remediation activities, has no duties other than site safety and health of the field team;
- Confirm the communication of the location-specific emergency response plan details to all employees assigned to a field project;
- Authorize the procurement of the necessary decontamination supplies;

- Verify that the applicable decontamination steps are clearly defined in the approved SH&E Plan;
- Verify staff are appropriately trained to execute the defined decontamination procedures;
- Verify that adequate staffing is available to safely conduct the applicable decontamination steps;
- Confirm that the necessary communications equipment for the project is available;
- Confirm that incident investigations are performed as required and a report is filed. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*;
- During spill response, all AECOM emergency responders and their communications shall be coordinated and controlled through the Manager. The individual in charge shall implement the and shall be responsible for the following tasks:
    - Become the individual in charge at the incident until relieved by more qualified personnel;
    - Notify the appropriate agency, the AECOM incident Reporting line, and operations. Refer to *S3AM-117-ATT1 Spill Notification Numbers North America* for US and Canadian required notifications;
    - Designate a safety supervisor who is knowledgeable about the operations being implemented at the emergency response site and who will have specific responsibility to identify and evaluate hazards and to provide direction on the safety of operations for the emergency at hand. If the safety supervisor judges activities to be an Immediately Dangerous to Life or Health (IDLH) and/or to involve an imminent danger condition, the safety supervisor shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene;
    - Identify all hazardous substances or conditions present and address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance, and handling procedures;
    - Implement appropriate emergency operations. Refer to *S3AM-010-Emergency Response Planning*;
    - Limit the number of emergency response personnel at the emergency site;
    - Implement the buddy system in groups of two or more;
    - Confirm that the PPE worn is appropriate for the hazards to be encountered;
    - Implement appropriate decontamination procedures after emergency operations have terminated.
- Responsibility for the emergency response shall be transferred upon arrival of a more qualified AECOM Incident Commander or a Public Service Incident Commander.
- Confirm appropriate communications concerning an emergency event are initiated as per *S3AM-010-PR1 Emergency Response Planning* and *SR1-003-WI2 Disruptive Event Response Instruction*.

4.1.2 **SH&E Manager or designee**

- Provide technical guidance for:
    - The development and implementation of SH&E Plans and Emergency Response Plans;
    - The Incident Commander regarding the correct way to respond to the spill;
    - Project-specific Spill Response Plans when required;

- Prepare emergency action plans as part of project SH&E Plans and emergency reference sheets;
- Interface with the local emergency responders when necessary;
- Interface with clients regarding facility emergency response procedures;
- Decide whether AECOM or an outside emergency response company will clean up the spill;
- Report spills, as necessary, to state/provincial environmental agencies;
- Review the incident report and facilitate the post-response discussion;
- Review and revise this procedure as necessary based on recommendations from post-response discussions;
- Advise Managers and Supervisors on the necessary decontamination procedures for the known or reasonably anticipated chemical hazards and physical agents associated with the planned scope of work;
- Support the project team to verify that adequate protective measures are in-place (e.g. Engineering Controls, Administrative Controls, Personal Protective Equipment, etc.).

4.1.3 **Site Safety Officer (SSO)**

- Verify that a SH&E PLAN is available for the project and is reviewed prior to the commencement of site activities;
- Conduct pre-entry briefing and daily tailgate meetings and review facility, site-specific emergency procedures, and site specific decontamination procedures;
- Communicate the site-specific emergency response details to all employees assigned to a field project;
- Establish the designated site work zones (e.g., EZ, CRZ, SZ, etc.);
- Enforce the applicable decontamination steps as defined in the approved SH&E Plan;
- Initiate Stop Work and emergency response procedures as required;
- Account for all AECOM and subcontractor employees after site evacuation;
- Brief on-site and off-site responders in the event of an emergency;
- Conduct site-specific training on the applicable decontamination steps/procedures;
- Procure the necessary decontamination supplies and establishing the decontamination line;

4.1.4 **Employees**

- Maintain HAZWOPER training, or equivalent training as it relates to the given jurisdiction;
- Follow the SH&E Plan and emergency procedures prepared for the project;
- Initiate Stop Work if necessary;
- Initiate emergency response via verbal communications or the alarm system if first to encounter an emergency;
- Follow the defined decontamination steps as stated in the approved SH&E Plan;
- Follow precautions and safe handling practices to avoid spills;
- Alert Manager to any deteriorating hazardous materials containers within the office or project area;
- Report all spills and leaks to the Manager immediately;
- Secure the spill area as quickly as possible and prevent the migration of exterior spilled materials or substances to drains or other openings; and

4.1.5 **All personnel** (e.g., AECOM employees, general laborers, equipment operators, chemists, supervisors, etc.) performing activities at hazardous waste sites that expose or potentially expose them to hazardous wastes and health hazards are considered HAZWOPER site workers and shall meet the training and medical surveillance requirements specified in 29 CFR 1910.120(e) and (f), respectively. Additional training may be required based on site activities including related exposures and risks (e.g., confined space entry, excavations, fall protection, other materials [lead], etc.). These additional training requirements are to be outlined in the project- or site-specific SH&E Plan.

4.2 Project SH&E Documentation—SH&E Plan

4.2.1 The project SH&E documentation prepared for HAZWOPER activities is referred to as a site-specific SH&E Plan, and shall meet the requirements presented in 29 CFR 1910.120(b)(4).

4.2.2 A safety and health risk or hazard analysis for each on-site task that will be performed.

4.2.3 The required SH&E Plan elements include:

- A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions);
- A summary of the work activities to be performed under AECOM's scope of activities;
- Identified risks shall include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task;
- Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses;
- Personal protective equipment (PPE) requirements for each work task**.** Refer to *S3AM-208-PR1 Personal Protective Equipment*;
- Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used;
- Site control measures;
- Decontamination procedures;
- An emergency response plan, *S3AM-010-PR1 Emergency Response Planning*, addressing actions to be taken in the event of each type of credible incident that might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans shall address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

4.2.4 Responsibility for development of each AECOM SH&E Plan will be coordinated between the Manager and the SH&E Manager or SH&E Department designee as part of project initiation. Regardless of where the SH&E Plan is developed, it will be reviewed and approved by the SH&E Manager prior to submission to any agency outside of AECOM.

4.2.5 Contractors and Subcontractors

- The health and safety of the employees of any contractor or subcontractor who does not have a contract directly with AECOM, and for whom AECOM does not have contractual safety oversight, is the responsibility of that contractor or subcontractor. The contractor or subcontractor shall evaluate the hazards and potential hazards to their own employees and shall adhere to their own Health and Safety Plan;
- Subcontractors who maintain a contract directly with AECOM shall comply with AECOM SH&E program requirements. Refer to *S3AM-213-PR1 Subcontractor Management*;
- In addition, all AECOM subcontractors' Health and Safety Plans shall, at a minimum conform to the requirements of the AECOM SH&E Plan. The AECOM SH&E Plan does not, nor is it intended to, address procedures of contractors or subcontractors during their site activities.

4.3 Personnel Qualifications— Training and Medical Surveillance

4.3.1 HAZWOPER-qualified employees shall participate in the following medical surveillance and training requirements. Medical surveillance and SH&E training requirements are further described in *S3AM-128-PR1 Medical Screening & Surveillance* and *S3AM-003-PR1 SH&E Training* respectively.

4.3.2 Employees receiving initial and refresher responder training shall be issued a certificate indicating training competency. Copies of all training records shall be maintained in accordance with the *S3AM-003-PR1 SH&E Training*.

4.3.3 Medical Surveillance

- Specific HAZWOPER medical examination protocols have been developed by AECOM's Corporate Medical Provider (CMP) to meet the requirements of 29 CFR 1910.120(f). To be medically qualified to perform HAZWOPER work, employees receive the following medical examinations:
    - Initial (Baseline) Examination — The initial examination is part of pre-employment requirements and shall be completed (with results received) prior to the employee's start of work date;
    - Annual Examination — HAZWOPER-qualified employees will complete a medical examination once each year. Medical qualification expires on the anniversary date of the last examination completed. There will be no "grace period" exemptions beyond this date without the express approval of the Region SH&E Manager. At the recommendation of the SH&E Department, the CMP may approve an alternate examination frequency at periods of up to two years (biennial) in cases in which the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel);
    - Termination Examination — When reassigned to non-HAZWOPER duties or at the conclusion of employment at AECOM, HAZWOPER-qualified personnel will be provided with the opportunity to receive a termination medical examination;
    - Special Examinations — The SH&E Department and the CMP will jointly determine the need for special examinations because of:
        - Unusual exposure conditions; and
        - In response to possible overexposures.
- The CMP will determine the medical protocol elements for each of these examinations based on exposure information provided by the SH&E Department. The CMP will evaluate the results of each Employee's examination and will provide a written statement of medical clearance clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120(f)) and approval of the Employee to perform unrestricted HAZWOPER activities. For initial and annual examinations, the CMP will also evaluate the Employee for the use of air purifying and supplied air respiratory protection. The written evaluation from these examinations will indicate the CMP's approval/limitations on the Employee's use of respiratory protection;
- If an Employee does not wish to participate in part or in the complete medical surveillance program, and is permitted by the given jurisdiction, the employee shall provide a written statement of refusal. Refer to *S3AM-128-PR1 Medical Screening & Surveillance*;

4.3.4 Training - HAZWOPER

All personnel assigned to work at a hazardous waste site, sampling at Treatment, Storage and/or Disposal Facilities (TSDFs), or are performing Remediation and Investigation Activities, shall participate in training meeting the requirements of 29 CFR 1910.120(e), or equivalent training as it relates to the given jurisdiction. All personnel shall have the following training:

- 40-hour initial Training — Before being assigned to a HAZWOPER site, AECOM Employees shall complete 40 hours of off-site training meeting the requirements of 29 CFR 1910.120(e)(3)(i). At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification shall be provided to the employee's SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 3 days of on-the-job training — The Employee shall receive 3 days of actual supervision by a trained experienced supervisor;
- Refresher 8-Hour Training — To remain qualified to perform on-site HAZWOPER work activities, each AECOM Employee will complete 8 hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120(e)(8) at yearly intervals following completion of Initial 40-hour training. At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification shall be provided to the employee's SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 8-hour Supervisor 8-Hour Training - any AECOM Employee acting in a management capacity for HAZWOPER activities (e.g., project manager, site safety officers, etc.), including oversight of subcontractor HAZWOPER activities, shall complete an additional 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120(e)(4). Although this training is required only once, supervisors shall maintain their overall HAZWOPER qualification through annual completion of refresher training. At the conclusion of Supervisor 8-Hour Training personnel will receive a written certification of course completion, signed by the instructor that indicates the course of instruction and the training date. A copy of this certification shall be provided to the SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 24-Hour HAZWOPER Training — Site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120(e)(3)(ii). Personnel potentially qualifying for this alternative training include:
    - Site support personnel who will not work in any Exclusion Zone areas;
    - Subcontractors and site visitors whose duties will not entail significant exposure to site contaminants defined as not working in any areas where airborne contaminant concentrations exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels. The SH&E Manager shall approve the substitution of 24-hour training for initial 40-hour training. Persons qualifying for 24-hour training shall provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training shall complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work and shall provide proof of this training (as necessary to demonstrate retraining) prior to beginning work on site.

Available Training Sources:

- On-site training provided by the SH&E Department;
- Outsourced training providers approved by the SH&E Department;

4.3.5 Training – Emergency Response

On an as-needed basis, if a project requires AECOM to provide a HAZMAT emergency response team, the following training requirements shall be met:

- Operations Level – a minimum of 8 hours of initial and refresher training for those responsible for acting defensively in the case of a release, attempting to contain the release from a safe distance;
- HAZMAT Technician – at least 24 hours of initial training and 8 hours of refresher training. They will participate in operations-level training and know how to implement the emergency response plan for the facility/site/project location;
- HAZMAT Specialist – at least 24 hours of initial training and 8 hours of refresher training. They will be trained in the same content as the HAZMAT Technician, as well as in how to develop a site safety and control plan;
- Incident Commander – will have at least 40 hours of training covering the Operations Level training and techniques for implementing the emergency response plan and directing the incident. They will be knowledgeable in relevant regulations. The Incident Commander will become the individual in charge of a site-specific incident command system and will coordinate and control communications with external agencies;

4.3.6 Subcontractor Personnel Training Records

Any subcontractor organization whose employees will support AECOM operations at a HAZWOPER site will:

- Provide the Manager with a copy of their written HAZWOPER medical surveillance and training program requirements. The elements of the program(s) shall be similar to those for AECOM's own program, as detailed above. Refer to *S3AM-213-PR1 Subcontractor Management*;
- Provide the Manager with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
    - A copy of the physician's signed medical clearance for each employee (preferred); or
    - A letter identifying the medical status and clearance expiration date of every employee, signed by the company's safety director or an officer of the company.
    - A copy of the each employee's training certifications, which will include:
        - The initial 40-hour training certificate (24-hour training may be substituted with SH&E Manager approval);
        - The most current Refresher training certificate (shall be current within the previous one-year period);
        - A copy of the Supervisor training certificate for each person serving in a site supervisory capacity (e.g., project manager, site safety officers, etc.).

4.4 HAZWOPER and Spill Response Equipment

4.4.1 Specific HAZWOPER activity and spill response equipment shall be identified in the site specific SH&E PLAN. All AECOM offices and project sites that store chemicals at their location shall have the appropriate spill response equipment. Such equipment may include the following:

- Over-pack containers of varying capacities;
- Absorbent material such as vermiculite or commercially prepared, absorbent containing pillows, rolls, sheets, or booms;
- Acid and base neutralizing agents;
- Chemically resistant gloves for solvents, alcohols, and acids;
- Poly-coated Tyvek coveralls;
- Safety goggles;
- Respiratory protection;

4.4.2 Spill response equipment shall be placed adjacent to areas where chemicals are routinely handled, stored, and/or where shipments are received. Similar types of spill response equipment shall also be available in any AECOM vehicle or rented vehicle in which chemicals are being transported. Location of spill response equipment shall be selected to permit access outside of likely spill locations.

4.4.3 Spill Response Equipment for Field Programs

- The amount of chemicals being used during a field program will dictate the types and quantity of spill response equipment that is brought to the site;
- If several squirt bottles of decontamination solution are all that is being brought to a site, a few spill pillows and a one-gallon bucket (3.8 liters) may be sufficient to respond to a spill of these materials;
- If gallons of chemicals are being delivered to the site in drums or bulk tanks, a greater variety of spill response equipment will be needed. As indicated previously, during these types of field programs, a separate spill plan will be incorporated into the project or site specific SH&E Plan, and will provide a greater level of detail regarding the specific spill response effort for that field program. Refer to *S3AM-209-PR1 Risk Assessment & Management*;

4.5 Personal Protective Equipment (PPE) Ensembles

4.5.1 Defined HAZWOPER PPE ensembles are specified for general use on all AECOM HAZWOPER operations. The project SH&E Plan may specify modifications to these requirements to meet site-specific conditions. Refer also to *S3AM-208-PR1 Personal Protective Equipment* for additional information concerning PPE requirements.

4.5.2 Level D Ensemble

The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work uniform to be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering hazardous substances or health hazards while working in controlled work areas.

Level D Equipment List:

- Hard hat;
- Eye protection;
- Safety-toe work boots;
- Shirts with sleeves and long pants (shorts are unacceptable for use); and
- Hearing protection (as required).

4.5.3 Modified Level D Ensemble

The Modified Level D ensemble provides moderate skin protection against contact with hazardous substances, but no respiratory protection. Its use is appropriate where there is a moderate-to-low potential for skin contact with known hazardous substances and health hazards, but no significant inhalation hazard is anticipated. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:

Modified Level D Equipment List:

- Full faceshield;
- Plain (uncoated) disposable coveralls;
- Chemical-resistant disposable outer coveralls;

- Chemical-resistant outer gloves taped to outer coveralls;[1]
- Chemical-resistant inner gloves; and[1]
- Chemical-resistant safety-toe boots (taped to outer coveralls).

4.5.4 Level C Ensemble

The Level C ensemble provides moderate skin protection against contact with hazardous substances and moderate respiratory protection. Its use is appropriate where there is the potential for skin contact with known hazardous substances and health hazards, together with a limited and well-defined potential for exposure via inhalation.

Level C Equipment List:

- Full-face air-purifying respirator (APR) equipped with cartridge types as designated in the project SH&E PLAN;[2]
- Plaind (uncoated) disposable coveralls;
- Chemical-resistant disposable outer coveralls;
- Chemical-resistant outer gloves taped to outer coveralls;[3]
- Chemical-resistant inner gloves;
- Hard hat;
- Safety-toe boots taped to coveralls; the use of boot covers (e.g., booties) or chemical-resistant boots may be specified; and
- Hearing protection (as required).

4.5.5 Level B Ensemble

The Level B ensemble provides both the highest level of inhalation exposure protection and considerable skin contact protection. Its use is appropriate where there are significant known or suspected hazardous substances and health hazards, involving both skin and inhalation exposure (up to and including Immediately Dangerous to Life or Health [IDLH] conditions) or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g. oxygen deficient atmospheres or chemicals with poor warning properties). The use of Level B PPE requires prior approval by the SH&E Manager.

Level B Equipment List:

- Supplied air respirator (SCBA or airline system with Grade D or better breathing air);
- Chemical-resistant disposable outer coveralls;
- Chemical-resistant outer glove taped to outer coveralls;[3]
- Chemical-resistant inner gloves;[3]
- Hard hat;
- Chemical resistant safety-toe boots taped to coveralls; and
- Hearing protection (as required).

1 Selection of specific glove types/materials will be provided in the project SH&E Plan based on consideration of the contaminants and the physical conditions of the work.

2 Selection of specific cartridges will be made by the SH&E Department (or Competent Person – Respiratory Protection as designated by the SH&E manager) based on contaminants present. A cartridge change-out frequency will also be specified in the SH&E based on the manufacturer's cartridge performance data.

3 Selection of specific glove types/materials will be provided in the project SH&E based on consideration of the contaminants and the physical conditions of the work.

4.5.6 Level A Ensemble

The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires prior approval by the Americas SH&E Director.

Specific Level A ensemble components will be determined on a case-by-case basis by the SH&E Department.

4.6 Emergency Response Plans

4.6.1 A Location Specific Emergency Response Plan shall be developed and implemented to handle anticipated emergencies prior to performing emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, and OSHA personnel. The plan shall be reviewed and approved by the SH&E Manager prior to issue.

4.6.2 AECOM'S *S3AM-010-PR1 Emergency Response Planning* shall apply and employees shall evacuate from the danger area whenever an emergency occurs, provided the associated contract does not require AECOM to provide emergency response services

4.6.3 AECOM Employees are not expected to take action or to participate in rescues or responses to chemical releases beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911).

- If AECOM Employees are to participate in the response to a chemical release beyond the initial reaction, there shall be a contractual provision for this response and the Employees shall be specifically trained for this response;
- This document is designed to provide guidelines on how to prepare a written plan that will confirm prompt and proper response to an emergency situation that arises during field investigations and to outline the duties of AECOM Employees during a field emergency and the associated training requirements.

4.6.4 Site specific SH&E plans that are prepared to comply with the HAZWOPER standard (29 CFR 1910.120) shall address emergency response. This standard specifically outlines the elements that shall be contained in an emergency response plan. However, the definition of emergency response, as written in 29 CFR 1910.120, focuses on emergencies involving the uncontrolled release of hazardous substances. Under 29 CFR 1910.120, an employer can opt to evacuate employees from the danger area when such an emergency occurs. AECOM does not expect its Employees to actively assist in the handling of uncontrollable chemical releases that may occur during the implementation of field programs. As such, and as provided by the HAZWOPER standard, AECOM is exempt from the emergency response plan requirements of the standard as long as it provides an emergency action plan within the SH&E PLAN that complies with 29 CFR 1910.38 (a). Therefore, all emergency response plans required under 29 CFR 1910.120 will be written to comply with 29 CFR 1910.38 (a).

- There are two types of emergency situations that AECOM personnel shall be prepared for and that shall be addressed in the emergency response plan. These include:
  - Emergencies related to the operations of our clients at the facility where AECOM is working;
  - Emergencies related to our own on-site activities/investigations.
- Employees are not to accept the role of Incident Commander without specific authority from the SH&E Manager and the Manager responsible for the project. Assuming the role of the Incident Commander requires training beyond the scope of this Procedure.

4.6.5 The HAZWOPER standard does not prohibit AECOM Employees from performing limited response activities.

- Appropriately trained AECOM Employees can provide voluntary First Aid services;
- AECOM Employees can provide response assistance by placing absorbent pillows or vermiculite around a small, contained spill that occurs during sampling efforts;
- Refer to Spill Response, Incidental procedures contained herein which describes the specific procedures that AECOM will follow when responding to an incidental chemical spill.

4.6.6 Field Project Preparation

- Every SH&E Plan that is prepared by AECOM will contain a Location Specific Emergency Response Plan in which the required elements of an emergency action plan will be addressed. Refer to *S3AM-010-PR1 Emergency Response Planning*;
- When AECOM is working at an operating facility, the emergency response procedures of the facility will be appended to the SH&E Plan or the Location Specific Emergency Response Plan;
- As a minimum, each emergency response plan shall contain the following topics as required by 29 CFR 1910.38 (a):
    - Procedures and contact information for reporting emergencies to public service responders and on-site (client or host employer) emergency control centers;
    - Pre-emergency planning and coordination with outside parties;
    - Emergency escape procedures and emergency escape route assignments;
    - Procedures to be followed by employees who remain to operate critical site operations before they evacuate;
    - Procedures to account for all employees after emergency evacuation is complete;
    - Rescue and medical duties for those employees who are trained to perform them;
    - Preferred means of reporting fires and other emergencies;
    - PPE to protect employees from expected exposures and potential exposures during an emergency;
    - Names of persons or departments who can be contacted for further information (i.e. emergency reference sheet);
    - Site security and control;
    - Availability of medical surveillance for workers who might have been exposed to chemicals, bloodborne pathogens, or other biological agents as a result of project work or emergency response;
    - Emergency medical treatment and first aid;
    - Emergency alerting and response procedures;
    - Critique of response and follow-up.
- In addition, each plan shall establish the specific alarm system that will be used on site to warn employees of an AECOM emergency. The chosen alarm signals should not conflict with alarm signals already in place at the facility.

4.6.7 Client Facility Emergency Response Procedures

- AECOM implements field programs on active properties, including manufacturing facilities. These facilities have typically developed an emergency response plan that is specific to facility-related emergencies. If AECOM is working at an operating facility, emergency procedures established by the facility shall be followed in the event of a facility catastrophe.

AECOM personnel shall be aware of and familiar with the alarm signals used at the facility to alert personnel to an emergency. AECOM personnel shall also know where to assemble in the event of a facility evacuation as the facility shall be able to account for all personnel, including subcontractors such as AECOM in the event of an evacuation.

- The first priority in AECOM's preparation of a project emergency action plan is to confirm that the responsibilities under the client's emergency response plan are fully understood. Because of the nature of their business, many of our clients have in-house fire brigades, medical staff, and hazardous materials teams that can assist AECOM in the event of an emergency related to our field activities. In many instances, our clients prefer or require that subcontractors seek emergency assistance through their facility first before calling outside responders to the site.
- A copy of the facility's procedures shall be made available to AECOM so that the information can be incorporated into the SH&E Plan or attached to the Location Specific Emergency Response Plan. If this information is not available to AECOM prior to arriving on site, the SSO shall meet with client representatives upon arrival to the facility to review procedures in the event of an emergency related to plant operations.

4.6.8 Escape Routes and Procedures

Although emergency evacuation procedures are included in AECOM's initial 40-hour HAZWOPER training, emergency procedures at each site will be different. Employees shall be instructed about the location specific emergency response plan. Updating training is required anytime escape routes or procedures change. An evacuation drill will be conducted for projects that are scheduled for one month or longer. Visitors and untrained employees shall not be allowed into the project area until they receive a safety briefing including evacuation alarms and procedures.

Prior to the commencement of on-site activities, the SSO shall determine how AECOM employees will evacuate each AECOM work area of the site:

- Two or more routes that are separate or remote from each other for each work area shall be identified. Multiple routes are necessary in case one is blocked by fire or chemical spill. These routes shall not overlap because, if a common point were obstructed, all intersecting routes would be blocked;
- Prominent wind direction should also be considered when designating escape routes and assembly areas. Escape routes and assembly areas should be upwind of the site whenever possible;
- Upon arrival to the site, the SSO shall verify that the selected routes are appropriate for evacuation. During an emergency, the quickest and most direct route should be selected. However, when working at an operating facility, the established escape routes of the facility should be used whenever possible;
- In the event of a facility-related emergency, all AECOM employees shall meet at the facility's assembly area so that the client can verify that AECOM has evacuated the property.

4.6.9 Alarm Signals

An emergency communication system shall be in effect at all sites.

- The most simple and effective emergency communication system in many situations will be direct verbal communications. However, verbal communications shall be supplemented any time voices cannot be clearly perceived above ambient noise levels and any time a clear line of sight cannot be easily maintained among all AECOM personnel because of distance, terrain, or other obstructions;
- Portable two-way radio communications may be used when employees shall work out of the line of sight of other workers;
- When it is necessary to supplement verbal communications, Employees shall be informed of the established emergency signals. The following emergency signals, or other appropriate signals, shall be implemented using handheld portable air horns, whistles, or similar devices.

Signals shall be capable of being perceived above ambient noise by all employees in the affected portions of the workplace:

- One Blast: General Warning—A relatively minor and localized, yet important, on-site event. An example of this type of an event would be a minor chemical spill where there is no immediate danger to life or health yet personnel working on the site should be aware of the situation so that unnecessary problems can be avoided. If one horn blast is sounded, personnel shall stop all activity and equipment on-site and await further instructions from the SSO;
- Three Blasts: Medical Emergency—A medical emergency for which immediate first aid or emergency medical care is required. If three horn blasts are sounded, all First Aid Providers should respond as appropriate. All other activity and equipment should stop and personnel should await further instructions from the SSO;
- Three Blasts Followed by One Continuous Blast: Immediate Threat to Life and Health — A situation that could present an immediate danger to life and health of personnel onsite. Examples include fires, explosions, large hazardous chemical release, severe weather-related emergencies, or security threats. If three horn blasts followed by a continuous blast are sounded, all activity and equipment shall stop. All personnel shall evacuate the site and meet in the designated assembly area where the SSO will account for all employees. The SSO will arrange for other emergency response actions if necessary. Information concerning the need to follow decontamination procedures during an emergency evacuation will be addressed in the Location Specific Emergency Response Plan;

- The SSO or his designate will acknowledge the distress signal with two short blasts on the air-horn or whistle;
- One Continuous Blast Following Any of the Above: All Clear/Return to Work — Personnel who sound the initial alarm are required to send an all clear signal when the emergency is over.

4.6.10 Accounting Method for All Employees after Evacuation

The SSO is responsible for determining that all AECOM employees have been successfully evacuated from the work area(s):

- It is the responsibility of each AECOM subcontractor to verify that all of its employees evacuated the site and to report this information to the SSO. All employees shall meet at the designated assembly area;
- A headcount is an acceptable way to determine complete evacuation when the field team is of a small size. The site log-in book or equivalent should be referenced when attempting to account for more than 10 people. In the event of a facility-related emergency, the SSO shall notify facility representatives that all AECOM employees and AECOM subcontract employees have successfully evacuated the work area(s);
- The SSO shall notify emergency responders if any employee is unaccounted for and where on the site they were last seen;
- In the event of a project-related emergency, the SSO will provide off-site emergency responders or on-site HAZMAT teams or fire brigades (Incident Commander) with all available knowledge about the emergency situation upon their arrival to the scene.

4.6.11 Employees Who Remain to Operate Critical Site Operations Before They Evacuate

All equipment and operations are required to cease in accordance with the established alarm signal procedures. The only exception will be related to health and safety:

- The SSO shall determine at the time of the emergency if health and safety will be jeopardized by immediate stoppage of any particular piece of equipment;

- If such a determination is made, personnel involved in critical operations shall be minimized. Once it is determined that the operation is no longer needed or the threat to the operators is imminent, operations will cease and the operators will immediately evacuate.

4.6.12 Rescue and Medical Response

- Only currently trained individuals will administer first aid, CPR or an AED. Refer to *S3AM-012-PR1 First Aid*.
- In the event of an incident, refer to material's SDS labels to confirm proper first aid is administered for the hazardous material and call the nearest Poison Centre or 911. Refer to *S3AM-012-PR1 First Aid*.
    - The American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-1998) recommends that the affected body part shall be flushed immediately and thoroughly for at least 15 minutes using a large supply of clean fluid under low pressure. However, other references recommend a minimum 20-minute flushing period if the nature of the contaminant is not known. The flushing or rinsing time can be modified if the identity and properties of the chemical are known. For example, at least:
        - 5 minutes flushing time for mild irritants;
        - 20 minutes for moderate to severe irritants;
        - 20 minutes for non-penetrating corrosives;
        - 60 minutes for penetrating corrosives;
        - If irritation persists, repeat the flushing procedure.
- It is important to note that ingestion of any chemical is not likely to occur in the workplace. If ingestion does occur, evidence indicates that inducing vomiting is not necessary in most situations where there has been an occupational chemical ingestion.
    - Induction of vomiting should only be recommended if the chemical has very high, short-term (acute) toxicity, and medical follow-up is not readily available;
    - In these cases, first aiders should receive special training on how to safely and effectively induce vomiting in the appropriate circumstances.
- If the injury is life threatening, the Emergency Medical System (EMS) should be called (911). Depending on the procedures established for the project, the SSO would contact an emergency responder directly or notify the facility representatives for medical assistance;
- If the employee needs medical attention that cannot be provided on-site, the SSO shall escort the individual to the local hospital identified on the emergency reference sheet and shall remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the Manager and SH&E Manager.

4.6.13 On-site and Off-site Communications

Regardless of the size or location of AECOM's field projects, it is extremely important that both on-site and off-site communications be maintained so that in the event of an emergency employees can contact each other or place a phone call immediately with the appropriate responder(s).

A reliable and approved form of communication (e.g. two way radio, cell phone, etc.) is required when members of the field team are working in separate areas of the site and verbal communications are no longer effective because of distance. A communication device shall be available for each team that is working in a separate area of the site.

When AECOM is working at an occupied facility, a telephone may be accessible. When AECOM is working on abandoned properties or when there is no access to a phone, as appropriate, a cellular telephone, two-way radio, or satellite telephone shall be brought to the work location.

4.6.14 Preferred Means of Reporting

Employees shall immediately notify the Supervisor of incidents and emergencies, and report in accordance with *S3AM-004-PR1 Incident Reporting, Notification & Investigation*:

- Unless facility representatives specifically indicate that they prefer AECOM personnel to notify them first of an emergency, the SSO will directly contact the appropriate emergency responders listed on the Location Specific Emergency Response Plan;
- Additional communications within AECOM concerning an emergency event may be required as per *S3AM-010-PR1 Emergency Response Planning* and *SR1-003-WI2 Disruptive Event Response Instruction*;
- "Dangerous occurrences" shall be reported immediately to the police, employer, vehicle owner/leaser and the dangerous goods owner. Such events would include spills, bulk container damage, fire, explosion, and transportation accidents involving dangerous goods;
- Confirm and seek direction on external reporting requirements. Each jurisdiction has regulations governing the minimum quantities for reporting based on the type of product spilled or release refer to *S3AM-117-ATT1 Spill Notification Numbers for North America*;

Individuals who have knowledge of a spill, release, or unlawful discharge, shall notify authorities immediately. Reporting does not imply guilt or assign blame. The following details are to be reported:

- Location and time of spill;
- Description of circumstances leading to spill;
- Type and quantity of material or substance spilled;
- Details of any action taken at the site of the spill;
- Description of location of spill and immediately surrounding the area;
- Any additional information in respect of the spill that the Minister, Environmental Protection Officer or person designated by regulations requires.

4.6.15 First Responder

First responders shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

- An understanding of what hazardous substances are, and the risks associated with them in an incident;
- An understanding of the potential outcomes associated with an emergency;
- The ability to recognize the presence of hazardous substances and physical hazards in an emergency;
- An understanding of the role of the first responder;
- The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.6.16 First Responder HAZWOPER Operations Level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release:

- They are trained to respond in a defensive fashion without actually trying to stop the release; Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures;

- First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:
    - Knowledge of the basic hazard and risk assessment techniques;
    - Know how to select and use proper personal protective equipment provided to the first responder operational level;
    - An understanding of basic hazardous materials terms;
    - Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit;
    - Know how to implement basic decontamination procedures;
    - An understanding of the relevant standard operating procedures and termination procedures;

4.6.17 Hazardous Materials Technician

Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the employer's emergency response plan;
- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment;
- Be able to function within an assigned role in the Incident Command System, refer to *Federal Emergency Management Agency—FEMA: Incident Command System*;
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician;
- Understand hazard and risk assessment techniques;
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit;
- Understand and implement decontamination procedures;
- Understand termination procedures;
- Understand basic chemical and toxicological terminology and behavior.

4.6.18 Hazardous Materials Specialist

Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the local emergency response plan;
- Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment;
- Know the state or applicable jurisdictional emergency response plan;
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist;
- Understand in-depth hazard and risk techniques;
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available;

- Be able to determine and implement decontamination procedures;
- Have the ability to develop a site safety and control plan;
- Understand chemical, radiological, and toxicological terminology and behavior.

4.7 Decontamination Procedures

4.7.1 When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).

4.7.2 All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. An attendant may not be required for Level D equipment removal and decontamination. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.

4.7.3 All persons and equipment entering the EZ shall be considered contaminated, and thus, shall be properly decontaminated prior to entering the SZ. No equipment, including personal protective equipment or contaminated clothing shall be taken or worn into the SZ.

4.7.4 Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel shall assess the potential exposures created by the decontamination chemical(s) or solutions. The safety data sheets shall be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

4.7.5 All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements identified in the approved work plan.

4.7.6 For all Level A and B ensembles, adequate supplied air shall be available to allow the employee to safely complete all necessary decontamination steps.

4.7.7 Where decontamination procedures involving radioactive materials are required, the removable limits for both personnel and equipment will be specified by a Certified Health Physicist or Certified Industrial Hygienist in the project's approved Radiation Protection Plan or approved safety planning document.

4.7.8 Materials Needed to Decontaminate Personnel and/or Equipment

- The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:
    - Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
    - Hoses, buckets of water or garden sprayers for rinsing;
    - Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
    - Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
    - Metal or plastic cans or drums for the temporary storage of contaminated liquids;
    - Paper or cloth towels for drying protective clothing and equipment; and
    - Poly or plastic sheeting to lay down and form the base for the CRZ, as well as to contain contaminants and decontamination fluids.

4.7.9 Personal Decontamination Steps

- The decontamination plan shall be in writing and shall specify the exact steps in either wet or dry decontamination or personnel exiting the EZ to the SZ. The decontamination plan shall also address respirator cartridge change out, SCBA bottle changes and equipment decontamination.

4.7.10 Decontamination Steps during a Medical Emergency

- If decontamination can be done:
  - Wash, rinse and/or cut off protective clothing and equipment.
- If decontamination cannot be done:
  - Wrap the victim in blankets, plastic sheeting, or rubber to reduce contamination of other personnel;
  - Alert emergency and offsite medical personnel to potential contamination;
  - Instruct them about specific decontamination procedures if necessary;

4.7.11 Equipment Decontamination Steps

- All equipment leaving the EZ shall be considered contaminated and shall be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools;
- All Employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of protection required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, Employees may be required to follow the proper personal decontamination procedures above;
- For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to confirm proper decontamination. Personnel operating a high pressure washer will be trained in the operation of the equipment and follow the manufacturer's operational instructions;
- For smaller equipment, use the following steps for decontamination:
  - Remove majority of visible gross contamination in EZ;
  - Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment;
  - Rinse equipment;
  - Visually inspect for remaining contamination;
  - Follow appropriate personal decontamination steps outlined above.
- All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ. Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

4.8 Employee Exposure Monitoring

4.8.1 Explosive levels, oxygen levels, and airborne contaminants may present potential hazards to HAZWOPER personnel working within controlled work areas and to non-HAZWOPER workers and the general public present outside the controlled work areas.

4.8.2 As appropriate, exposure monitoring at HAZWOPER sites will be conducted to determine explosive and oxygen levels, monitor and control employee exposures to airborne contaminants, and to determine and regulate controlled work area boundaries (e.g., support zone, contamination reduction zone, and exclusion zone) for the protection of non-HAZWOPER workers and the general public.

4.8.3 Specific exposure monitoring requirements will be established in individual SH&E Plans. Refer to *S3AM-127-PR1 Exposure Monitoring*. All monitoring efforts using direct reading instruments and will remain part of the project file.

4.8.4 Work Area Exposure Monitoring

- Work area exposure monitoring will include breathing zone readings for the maximum exposed worker(s);
- Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the SH&E Plan.

4.8.5 Perimeter Exposure Monitoring

- Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site and will be collected near the work zones when performing work at an active client facility. Refer to *S3AM-127-PR1 Exposure Monitoring*;
- Perimeter exposure monitoring will be conducted at locations downwind from the project activities at a minimum (also upwind if the potential exists for offsite contamination to migrate onto the site).

4.8.6 Exposure results will be posted on site and explained in a safety briefing.

4.8.7 Employees will receive a written statement of results within 15 days of receipt from the laboratory.

4.8.8 Results of all personal exposure monitoring will be provided to the SH&E department for inclusion in the employee medical records, refer to *S3AM-017-PR1 Injury & Illness Recordkeeping*.

5.0 Records

5.1 All forms and documents generated during a HAZWOPER project will be maintained in the project file.

5.2 All medical screening and surveillance documentation shall be retained for 30 years.

6.0 Attachments

6.1 S3AM-117-ATT1 Spill Notification Number for North America

Americas

Spill Notification Numbers for North America

S3AM-117-ATT1

Jurisdiction	Name	Phone
Within the United States		
National Response Center		1-800-424-8802
AECOM Incident Reporting Number		1-800-348-5046
Within Canada		
AECOM Incident Reporting Number		1-800-348-5046
Alberta	Environmental Service Response Centre	1-800-222-6514
British Columbia	Provincial Emergency Program	1-800-663-3456
Manitoba	Conservation Emergency Response Program	1-204-944-4888
New Brunswick	Canadian Coast Guard	1-800-565-1633
Newfoundland & Labrador	Canadian Coast Guard	1-800-563-9089
NWT & Nunavut	Spill Report Line	1-867-920-8130
Nova Scotia	Canadian Coast Guard	1-800-565-1633
Ontario	Spill Action Centre	1-800-268-6060
Prince Edward Island	Canadian Coast Guard	1-800-565-1633
Quebec	National Environmental Emergencies Center	1-866-283-2333
Saskatchewan	Spill Report Centre	1-800-667-7525
Yukon Territory	Spill Report Centre	1-867-667-7244

Americas

Heat Stress

S3AM-113-PR1

1.0 Purpose and Scope

1.1 Establishes a Heat Illness Prevention Program to guide employees in preventing heat illness, recognition of the symptoms of heat stress-related illnesses and in taking the appropriate corrective action.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Acclimated –** Employees who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.

2.2 **Chemical Protective Clothing (CPC)** – Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the Employee with potentially hazardous materials in the workplace. Such materials include Tyvek® coveralls (all types) and polyvinyl chloride coveralls and rain suits.

2.3 **Heat Cramps** – A form of heat stress brought on by profuse sweating and the resultant loss of salt from the body.

2.4 **Heat Exhaustion** – A form of heat stress brought about by the pooling of blood in the vessels of the skin and in the extremities.

2.5 **Heat Rash** – A heat-induced condition characterized by a red, bumpy rash with severe itching.

2.6 **Heat Stress** – The combination of environmental and physical work factors that constitute the total heat load imposed on the body.

2.7 **Heat Stroke** – The most serious form of heat stress, which involves a profound disturbance of the body's heat-regulating mechanism.

2.8 **Sunburn** – Caused by unprotected exposure to ultraviolet radiation present in sunlight that is damaging to the skin (Refer to *S3AM-121-PR1 Non-Ionizing Radiation*). The injury is characterized by red painful skin, blisters, and/or peeling.

2.9 **Unacclimated** – Employees who have not been exposed to hot work conditions for one week or more or who have become heat-intolerant due to illness or other reasons.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3AM-010-PR1 Emergency Response Planning

3.4 S3AM-121-PR1 Non-Ionizing Radiation

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 Managers

- Evaluate the need for heat illness prevention measures and incorporate as appropriate into the Safe Work Plan or Task Hazard Analysis.
- Allocate sufficient resources for the management of heat illness in the field including the provision of water, a shaded break area, and sufficient schedule to allow for breaks.

4.1.2 Safety, Health and Environment (SH&E) Manager

- Provide heat illness awareness training.
- Assist in developing appropriate work-rest schedules.
- Conduct/support incident investigations related to potential heat stress-related illnesses.

4.1.3 Supervisor

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned Employees.
- Confirm that Employees have been trained on the recognition of heat illness.
- Confirm that this procedure, along with any applicable Safe Work Plan and/or Task Hazard Analysis (and heat exposure control plan that may be contained therein) are made available to affected Employees.
- Confirm that adequate supplies of appropriate fluids are readily available to Employees.
- Confirm that a proper rest area is available.
- Conduct heat illness monitoring, as applicable.
- Implement the work-rest schedule.
- Confirm that first aid measures are implemented once heat stress symptoms are identified.
- Confirm personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- Report all suspected heat illnesses.

4.1.4 Employee

- Observe each other for the early symptoms of heat illnesses.
- Maintain an adequate intake of available fluids.
- Be familiar with heat stress hazards, predisposing factors, and preventative measures.
- Report to work in a properly vested and hydrated condition.
- Report all suspected heat stress-related illnesses.

4.2 Restrictions

4.2.1 The Buddy System is required when working in high heat conditions; Employees shall not work alone.

4.2.2 Employees shall not be exposed to levels exceeding those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.2.3 Clothing corrections shall be applied in accordance with the tables provided in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.3 Exposure Controls

4.3.1 It shall be determined whether Employees are or may be exposed to hazardous heat levels. The Supervisor shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of Employees. Assessment shall include, but not limited to:
  - Ambient temperature.
  - Amount of sunshine (cloudy, clear). Refer to *S3AM-121-PR1 Non-Ionizing Radiation* additional direction concerning ultraviolet radiation exposures.
  - Other radiant heat sources (e.g. motor, fire, etc.).
  - Humidity.
  - Air flow.
  - Amount or type of physical labor being performed,
  - Physical condition of the Employees (e.g., acclimated/not)
  - Protective clothing in use.
  - Referral to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* to assist in determining whether hazardous heat exposures may exist.
- If potential for hazardous exposure is identified, the Supervisor shall develop and implement a heat stress exposure control plan within the Safe Work Plan and/or Task Hazard Analysis. Refer to *S3AM-209-PR1 Risk Assessment & Management.*

4.3.2 If Employees are or may be exposed, the Supervisor shall implement engineering controls (e.g., shelters, cooling devises, etc.) to reduce the exposure of Employees to levels below those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.3.3 If engineering controls are not practicable, the Supervisor shall reduce the exposure of Employees to levels below those listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* by providing administrative controls, including a work-rest cycle or personal protective equipment, if the equipment provides protection equally effective as administrative controls.

4.3.4 If Employees are or may be exposed, the Supervisor shall provide and maintain an adequate supply of cool, fresh, potable water close to the work area for the use of a heat exposed Employee. Water shall be provided (paid) by the project or program; if Employees purchase their own drinking water because water is not otherwise available on site, they shall be reimbursed.

4.3.5 If an Employee shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant on site, if available, or by a physician, refer to *S3AM-113-ATT2 Heat Stress – Symptoms & Treatment* for more specifics.

4.4 Heat Stress Planning

4.4.1 Heat stress can be a significant site hazard, especially for Employees wearing CPC. To prepare for emergency response planning, refer to *S3AM-010-PR1 Emergency Response Planning* procedure.

4.4.2 The project and site-specific heat related risks shall be identified. Appropriate prevention and control measures shall be developed and documented in the project's SH&E Plan or included as a supplement to the SH&E Plan (e.g., *S4[DCS]AM-113-FM1 Heat Illness Prevention Plan – DCS Americas*) and the Task Hazard Assessments (THA). Refer to the *S3AM-209-PR1 Risk Assessment & Management* procedure.

4.4.3 The heat a worker is exposed to may be a combination of air temperature, radiant heat, and humidity. The WBGT (wet-bulb globe thermometer) is a useful index of the environmental

contribution to heat stress. Because WBGT is only an index of the environment, the contributions of work demands, clothing, and state of acclimatization shall also be accounted for, as described in the following steps.

- Monitor ambient temperatures and conduct heat stress monitoring in accordance with the location specific SH&E Plan. Revise the heat stress monitoring and controls if there are any reports of discomfort due to heat stress.
- Monitor temperatures in each unique environment in which workers perform work (e.g., take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in the outdoor area where field employees work, etc.). Follow manufacturer's instructions on proper use of the WBGT.
- Determine if individual workers are acclimatized or un-acclimatized. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, or when there is a sustained increase in temperatures of 10 °F (5.6 °C) or more, and a noticeable loss occurs after 4 days. A worker can be considered acclimatized for the purpose of this procedure when they have been exposed to the site conditions (including level of activity) for 5 of the last 7 days.
- Determine the approximate workload of each worker or group of workers. The following examples (Table 1) can be used for comparison:

Table 1
Examples of Activities within Workload Categories

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on level at 3.5 miles/hr (6 km/hr) while carrying 6.6 lbs (3kg) weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a non-continuous basis
	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
Very Heavy	Shoveling wet sand

- Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.
- For workers wearing cloth coveralls (e.g., Nomex fire resistant clothing), add 3 to the measured WBGT. For impermeable clothing, such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70ºF (21°C).
- Use the collected information to develop appropriate work to rest schedules as detailed in *S3AM-113-ATT1 Heat Stress – Temperature Threshold*. Work-rest schedules and water provision shall be documented in the applicable SH&E Plan or supplementary Health Illness Prevention Plan and may be additionally documented using logs such *as S3AM-113-FM2 Daily Heat Illness Prevention Log*.

4.4.4 Given the work demands (light, moderate, heavy or very heavy), heat of the work environment, and such aspects as PPE in use, workload will be adjusted appropriately to allow for proper acclimation.

- This is the process by which the body "gets used to" hot work environments. This is achieved by slowly increasing workloads.
- New and returning Employees (absent one week or more) who have not had time to acclimatize may be more susceptible to heat related illnesses, even in seemingly low risk heat exposures.
- All Employees shall be allowed time to acclimatize in the event of a heat wave. All Employees assigned to a new process with additional heat exposures shall be allowed to acclimatize.
- Minimize workload and gradually increase as tolerance is built up. Allow for more frequent breaks.
- While acclimatization normally takes approximately 5 to 7 days, heightened monitoring of these Employees will be maintained for the first 14 days.

4.4.5 Employees shall be instructed in the recognition of heat stress symptoms, the first aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Employees shall be encouraged to immediately report any heat stress that they may experience or observe in fellow Employees. Supervisors shall use such information to adjust the work-rest schedule to accommodate such problems.

4.4.6 Wherever possible, a designated break area should be established in an air-conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow Employees to loosen or remove protective clothing, and sufficient seating should be available for all Employees. During breaks, Employees shall be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

4.5 Symptoms and Treatment

4.5.1 Refer to *S3AM-113-ATT2 Heat Stress – Symptoms & Treatment*.

4.5.2 Employees who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin) shall be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water.

4.5.3 Severe heat stress (heat stroke) is a life-threatening condition requiring immediate emergency medical care (e.g., call 911). Anyone exhibiting symptoms of heat stroke (slurred speech, unconsciousness, etc.) shall be taken immediately to the nearest medical facility. Steps shall be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.6 Prevention

4.6.1 Requirements for working in extreme heat may be triggered by regulatory established criteria (e.g. CAL/OSHA requires high heat procedures when temperature equals or exceeds 95°F) or as a result of a hazard analysis assessing various contributory factors (refer to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*). Employees working in extreme heat or sun should understand and apply the following guidelines for preventing and detecting heat exhaustion and heat stroke.

- When possible, begin hydrating at least three days prior to working in high heat conditions.
- Review the heat stress exposure control plan within the SH&E Plan, and/or Task Hazard Analysis.
- If the supervisor is not immediately available confirm a reliable method of communication is in place to allow for contact with supervision. In the absence of cellular reception, a satellite phone or similar device may be required.

- Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
- Try to schedule work for the coolest part of the day, early morning and evening.
- Avoid strenuous physical activity outdoors during the hottest part of the day.
- Avoid sudden changes of temperature. Refer *to S3AM-113-ATT1 Heat Stress – Temperature Threshold*s.
- Air out a hot vehicle before getting into it.
- Obtain medical direction if taking diuretics during hot weather (a lower dose may be necessary).
- When working in heat, drink 1 quart of water per hour of work.
- Avoid caffeine and alcohol as they increase dehydration.
- Monitor urine frequency and color to detect dehydration. Refer to the *S3AM-113-ATT3 Dehydration Chart.*
- The Buddy System is required when working in high heat conditions to enable effective communication and cross-observation for indications of heat stress.
- Initiate emergency response procedures when necessary, including contacting emergency medical services as appropriate and in accordance with the Emergency Response Plan.

4.6.2 Personal Protective Equipment

- Review the *S3AM-208-PR1 Personal Protective Equipment* procedure.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Apply sunscreen to exposed skin (SPF 30 or greater, follow directions on label).
- Wear sunglasses with UV protection.
- Pack extra water to avoid dehydration (try freezing water in bottles overnight to help keep the water cooler for longer during the day).

4.7 Work-Rest Schedule Practices

4.7.1 Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.

- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 ounces (1 quart) per hour during the work shift; fluid replacement at frequent intervals is most effective.
- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.

4.7.2 Additional salt is usually not needed and salt tablets should not be taken.

4.7.3 Fluids for drinking should be cool and fresh, but not cold.

4.7.4 Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.

- A relatively cool, shaded area shall be provided for breaks when working in hot environments. For hazardous waste sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decontamination area so workers can take breaks without going through full decontamination.

- If shade is not available, shaded areas shall be constructed. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.
- Cooling measures other than shade (e.g., misting, air-conditioned break areas, air conditioned vehicles, etc.) can be used in lieu of shade provided it can be demonstrated that they are at least as effective in cooling employees.
- Employees should have access to these rest areas at break times and at any other time when suffering from heat illness or believing a preventive recovery period is needed.

4.7.5 Dry clothing or towels should be available to minimize chills when taking breaks.

4.7.6 Manual labor will not be performed during breaks, other than paperwork or similar light tasks.

4.7.7 Other controls that may be used include:

- Scheduling work at night or during the cooler parts of the day (6 am–10 am, 3 pm–7 pm).
- Erecting a cover or partition to shade the work area.
- Auxiliary cooling - wearing cooling devices beneath protective garments, but over any underclothing.
    - If cooling devices are worn, only physiological monitoring will be used to determine work activity.
    - These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.
    - The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.
    - The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.
- Auxiliary cooling should be considered when the following conditions exist:
    - Ambient temperature over 80°F (26°C).
    - Workers are wearing impermeable garments (i.e., Tyvek, Saranex, Chemrel, etc.).
    - It is desirable to have long work shifts with minimum interruption.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

4.8.1 Once a work-rest schedule is established, the Supervisor shall continually evaluate its effectiveness through observation of Employees for signs/symptoms of heat stress. Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.

4.8.2 Measurement or physiological monitoring of each Employee's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate. Refer to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* for additional guidance on when physiological monitoring should be conducted.

4.8.3 Frequency of physiological monitoring is increased or decreased depending upon such factors as worker fitness, acclimatization, temperature of the work environment, type of PPE, etc.

Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:

- The work period may be increased (generally, by 5- to 10-minutes intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers are recovering adequately (see below), and on the judgment of the SH&E Manager.
- The work period shall be decreased if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).

4.8.4 If physiological monitoring is conducted, the Employee and/or the SH&E Manager (or appropriate designate) shall measure and record body temperature and pulse rate as described below.

4.8.5 Monitor body temperature to determine if Employees are adequately dissipating heat build-up. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:

- Measure oral body temperature at the end of the work period. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.
- If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
- If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
- Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).

4.8.6 At the start of the workday each Employee's baseline pulse rate (in beats per minute [bpm]) is determined by taking a pulse count for 15 seconds and multiplying the result by four or by using an automated pulse count device. Pulse rates can then be measured at the beginning of each break period and two minutes thereafter to determine if the rest period allows for adequate recovery.

- Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.
- Wait 2 minutes and repeat the pulse measurement. Record this as P2.
- If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 – P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.
- At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 – P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.
- At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 – P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 – P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

4.8.7 Use of an automated or similar blood pressure device will be used to assess each Employee's blood pressure at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- If the blood pressure of an Employee is outside of 90/60 to 150/90, then the Employee will not be allowed to begin or resume work; extend the break period by at least five minutes, at the end of which blood pressure rates will be re-measured and the end-of-break criteria again applied.

4.8.8 All physiological monitoring of heat stress will be documented using *S3AM-113-FM1 Heat Stress Monitoring Log.*

4.9 Training

4.9.1 Employees and their Supervisors that may be exposed to the hazard will be trained and oriented to the hazard and the controls prior to work commencing.

4.9.2 Those Employees, including Supervisors, potentially exposed to heat stress will receive training, refer to the *S3AM-003-PR1 SH&E Training* procedure. Training will include, but is not limited to:

- Sources of heat stress (environmental and personal), influence of protective clothing, and importance of acclimatization;
- How the body handles heat and acclimatization;
- Recognition of heat-related illness symptoms;
- Preventative/corrective measures including, but not limited to;
  - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
  - All Employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
- First aid procedures for heat stress-related illnesses; and
- Immediate reporting of any heat-related incident (injury, illness, near-miss), refer to the *S3AM-004-PR1 Incident Reporting, Notifications & Investigation* procedure.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-113-ATT1 Heat Stress - Temperature Thresholds

6.2 S3AM-113-ATT2 Heat Stress - Symptoms & Treatment

6.3 S3AM-113-ATT3 Dehydration Chart

6.4 S3AM-113-FM1 Heat Stress Monitoring Log

6.5 S3AM-113-FM2 Daily Heat Illness Prevention Log

6.6 S3[DCS]AM-113-FM1 Heat Illness Prevention Plan – DCS Americas

Americas

Heat Stress – Temperature Thresholds

S3AM-113-ATT1

1.0 Work-Rest Schedule

The prevention of heat stress is best performed through Supervisor observation of Employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow Employees to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks shall be determined by the Supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the Employees (e.g., acclimated/not), and protective clothing being used.

1.1 Establishing a Work-Rest Schedule:

1.1.1 AECOM permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method: This method is preferred if a WBGT meter is available.
- Adjusted Temperature Method: This method should be used only if WBGT data is not available.

1.1.2 Either procedure will provide the Supervisor with a recommended routine; however, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

1.2 WBGT Work-Rest Schedule Guidelines:

1.2.1 If the measured WBGT is less than the action limit value, there is little risk of excessive exposure to heat stress, and work can continue.

- Continue to monitor ambient conditions with the WBGT. However, if there are reports of the symptoms of heat-related disorders, then the analysis of little risk should be reconsidered.
- If the measured WBGT is greater than the values in the following two tables, institute heat stress controls, including the associated work-rest cycle, and perform physiological monitoring as described in *S3AM-113-PR1 Heat Stress*.
- Because of the physiological strain associated with very heavy work among less fit workers regardless of WBGT, values are not provided in Table 1 or 2 for continuous work or 75% work – 25% rest regimen. Physiological monitoring should always be implemented under these conditions.

1.2.2 Table 1, the Non-CPC Activities WBGT Chart, is intended for use where personnel are not utilizing Chemical Protective Clothing (CPC). Where workers are required to utilize CPC, Table 2, the CPC Activities WBGT Chart, will be used.

1.2.3 WBGT readings are compared directly with the values of the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85°F (29.4°C)	81°F (27.2°C)	78°F (25.6°C)	
75% Work – 25% Rest	86°F (30°C)	83°F (28.3°C)	81°F (27.2°C)	
50% Work – 50% Rest	88°F (31.1°C)	85°F (29.4°C)	83°F (28.3°C)	81°F (27.2°C)
25% Work – 75% Rest	90°F (32.2°C)	87°F (30.6°C)	86°F (30°C)	85°F (29.4°C)

Modified from ACGIH's 2014 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers.

Table 2. CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74°F (23.3°C)	70°F (21.1°C)	67°F (19.4°C)	
75% Work – 25% Rest	75°F (23.9°C)	72°F (22.2°C)	70°F (21.1°C)	
50% Work – 50% Rest	77°F (25°C)	74°F (23.3°C)	72°F (22.2°C)	70°F (21.1°C)
25% Work – 75% Rest	79°F (26.1°C)	76°F (24.4°C)	75°F (23.9°C)	74°F (23.3°C)

Modified from ACGIH's 2014 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers.

1.3 Humidex Based Work-Rest Schedule Guidelines

1.3.1 The Humidex method is a simplified way of protecting workers from heat stress. It is an equivalent scale intended to express the combined effects of warm temperatures and humidity. Humidex is used as a measure of perceived heat that results from the combined effect of excessive humidity and high temperature.

1.3.2 This method requires only a local air temperature and relative humidity value. Monitoring shall continue throughout the day for changing conditions. Identify a representative location where measurements can be taken. Measurements should be recorded at least hourly when ambient temperatures and 90°F (32°C) for personnel wearing normal permeable work clothes.

- Step 1: On the Humidex table below, look up the temperature on the left (Celsius is located below RH>) and the relative humidity (RH) on the top. Determine the Humidex value.

F	RH>	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%
108	42													55	52	50	48	46
106	41												55	53	51	48	46	44
104	40											55	53	51	49	47	45	43
102	39										55	53	51	49	47	45	43	41
100	38		Step 1 - Determine HUMIDEX VALUE							54	53	51	49	47	45	43	42	40
99	37								54	52	51	49	47	45	44	42	40	38
97	36					57	55	53	52	50	49	47	45	44	42	40	39	37
95	35				56	54	53	51	50	48	47	45	43	42	40	39	37	36
93	34		56	55	53	52	51	49	48	46	45	43	42	40	39	37	36	34
91	33	55	54	53	51	50	48	47	46	44	43	41	40	39	37	36	34	33
90	32	53	51	50	49	48	46	45	44	42	41	40	38	37	36	34	33	32
88	31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30
86	30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29
84	29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28
82	28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
81	27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
79	26	39	38	37	36	35	34	33	33	32	31	30	29	28	27	26	25	24
77	25	37	36	35	34	33	33	32	31	30	29	28	27	26	26	25	24	23

- Step 2: Place the Humidex value into the Heat Index Adjustment Table below. Determine the applicable adjustments based on the given work or task.

Heat Index Adjustment Table

	Step 2 - Risk Factor Adjustment	
Write in value	What is the HUMIDEX value from the table in Step 1?	
	Radiant Heat	**Adjustment**
	Working in full-sun	Add 2
	Working in ½ or partial sun or weak radiant heat source	Add 1
	Working near very hot equipment surfaces or processes	Add 2
	Clothing: Pick One Only	
	Short/long sleeve shirt and pants – no overalls	None
	Overalls (e.g., Nomex suit)	Add 3
	Double layer overalls	Add 5
Stop	Impermeable clothing	Perform Physiological Monitoring
	Acclimatization	
	Have been working at least 5 of last 7 days in heat stress conditions.	Subtract 4
	Work Load & Miscellaneous Factors	
	Light Work (Standing, slow walking)	Subtract 2
	Medium Work (Walking about with moderate lifting or pushing)	None
	Heavy Work (Shoveling dry sand, carrying 50 lbs)	Add 2
	Very Heavy Work (Shoveling wet sand)	Add 3
	TOTAL – Compare to Heat Index Response Plan	

- Step 3: Compare adjusted Heat Index Total to the Heat Index Response Plan table to obtain guidance for work/rest.

Heat Index Response Plan*

TOTAL NUMBER	Final Step 3 - HEAT INDEX Response
30-33	alert & information & water
34-37	warning & increase water
38-39	75% work - 25% rest & monitor for signs of heat stress
40-41	50% work - 50% rest & monitor for signs of heat stress
42-44	25% work - 75% rest & monitor for signs of heat stress
45+	Perform Physiological Monitoring

*** Percent work and rest/recovery are on a per hour basis. Adjustments and subsequent work/rest cycle recommendations are rough guidelines only. No heat stress prediction scheme can replace monitoring of symptoms or a health care practitioners advice in the case of individuals with special medical conditions or predisposing circumstances for heat related illness. Always pay attention to the way workers are feeling. Recuperate if fatigued, nauseated, dizzy or thirsty,**

1.4 Adjusted Temperature Work-Rest Schedule Guidelines:

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments will be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the Adjusted Temperature, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest schedule.

Table 3. Temperature Adjustment Factors

Time of Day	
Before daily temperature peak[1]	+2°F (+1.11°C)
10 am – 2 pm (peak sunshine)	+2°F (+1.11°C)
Sunshine	
No clouds	+1°F (+0.56°C)
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F (-1.67°C)
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F (-2.78°C)
Cloudy (>7/8 cloud cover)	-7°F (-3.89°C)
Indoor or nighttime work	-7°F (-3.89°C)
Wind (*ignore if indoors or wearing CPC*)	
Gusts greater than 5 miles per hour at least once per minute	-1°F (-0.56°C)
Gusts greater than 10 miles per hour at least once per minute	+2°F (+1.11°C)
Sustained greater than 5 miles per hour	-3°F (-1.67°C)
Sustained greater than 10 miles per hour	-5°F (-2.78°C)
Humidity (*ignore if wearing CPC*)	
Relative Humidity greater than 90%	+5°F (+2.78°C)
Relative Humidity greater than 80%	+2°F (+1.11°C)
Relative Humidity less than 50%	-4°F (-2.23°C)
Chemical Protective Clothing (CPC)	
Modified Level D (coveralls, no respirator)	+5°F (+2.78°C)
Level C (coveralls w/o hood, full-face respirator)	+8°F (+4.45°C)
Level C (coveralls with hood, full-face respirator)	+10°F (+5°C)
Level B with airline system (hooded chemical resistant clothing)	+9°F (+5.56°C)
Level B with SCBA (hooded chemical resistant clothing)	+9°F (+5.56°C) and right one column[2]
Level A (totally encapsulating chemical protective suit)	+14°F (+7.78°C) and right one column
Other	Specified in the HASP
Miscellaneous	
Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

For complete descriptions of Level A through D Protective Clothing refer to Unites States 29 CFR 1910.120 Appendix B

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

[2] Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Regimen	Adjusted Temperature			
	Light Work	**Moderate Work**	**Heavy Work**	**Very Heavy Work**
No specified requirements	< 80°F (26.67°C)	< 75 (23.88°C)	< 70 (21.11°C)	< 65 (18.33°C)
15 minute break every 90 minutes of work	80°F – 90°F (26.67°C) - (32.22°C)	75 – 85 (23.88°C) - (29.44°C)	70 – 80 (21.11°C) - (26.67°C)	65 – 75 (18.33°C) - (23.88°C)
15 minute break every 60 minutes of work	>90 – 100 (32.22°C) - (37.77°C)	> 85 – 95 (29.44°C) - (35°C)	>80 – 85 (26.67°C) - (29.44°C)	>75 – 80 (23.88°C) - (26.67°C)
15 minute break every 45 minutes of work	>100 – 110 (37.77°C) - (43.33°C)	>95 – 100 (35°C) - (37.77°C)	>85 – 90 (29.44°C) - (32.22°C)	>80 – 85 (26.67°C) - (29.44°C)
15 minute break every 30 minutes of work	>110 – 115 (43.33°C) - (46.11°C)	>100 – 105 (37.77°C) – (40.55°C)	>90 – 95 (32.22°C) - (35°C)	>85 – 90 (29.44°C) - (32.22°C)
15 minute break every 15 minutes of work	>115 – 120 (46.11°C) - (48.88°C)	>105 – 110 (40.55°C) - (43.33°C)	>95 -100 (35°C) - (37.77°C)	>90 – 95 (32.22°C) - (35°C)
Stop Work	**>120** (48.88°C)	**>110** (43.33°C)	**>100** (37.77°C)	**>95** (35°C)

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

Work-rest schedules and water provisioning may be documented using logs such *as S3AM-113-FM2 Daily Heat Illness Prevention Log*.

Americas

Heat Stress – Symptoms & Treatment

S3AM-113-ATT2

1.0 Heat Illness Symptoms

1.1 The following are four stages of heat-related illness:

1.1.1 Heat Rash

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by un-evaporated sweat. The papules may become infected unless treated.

1.1.2 Heat Cramps

Heat cramps are painful muscle cramps caused by heavy sweating and inadequate electrolyte replacement due to over-exertion in extreme heat. Symtpoms include:

- Muscle spasms; and
- Pain in the hands, feet, and abdomen.

1.1.3 Heat Exhaustion

Heat exhaustion is the next stage. Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Symptoms include:

- Cool, moist, pale, flushed or red skin;
- Heavy sweating;
- Headache;
- Nausea or vomiting;
- Dizziness;
- Exhaustion;
- Mood changes (irritable, or confused/can't think straight), and
- Fainting

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated, but not higher than 104ºF (40ºC). It is important to recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

1.1.4 Heat Stroke

Heat exhaustion can sometimes lead to heat stroke, the most serious form of heat stress, which can be fatal and requires emergency treatment. Heat stroke happens when body temperature regulation fails and body temperature continues to rise to critical levels, often to 105 degrees Fahrenheit (°F) (40.5 degrees Celsius [° C]) or higher. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Symptoms of heat stroke:

- Vomiting;
- Decreased alertness level or complete loss of consciousness;
- Slurred speech;
- High body temperature (sometimes as high as 105°F [40.5°C]);
- Red, hot, usually dry skin;
- Lack of or reduced perspiration;
- Skin may still be moist or the victim may stop sweating and the skin may be red, hot, and dry;

- Rapid, weak pulse or rapid, strong pulse;
- Rapid, shallow breathing;
- Nausea;
- Dizziness and confusion; and
- Coma.

2.0 Recommended Treatment for Heat Stress-related Illnesses

2.1 Heat Rash

2.1.1 Treatment for heat rash includes:

- Shower after work, dry off thoroughly, and put on clean, dry underwear and clothes;
- Try to stay in a cool place after work;
- If, in spite of this, you develop heat rash, contact WorkCare.

2.2 Heat Cramps

2.2.1 Treatment for heat cramps includes:

- Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary;
- Take more frequent breaks and drink more water;
- Move victim to a cool place;
- Administer drinks of cool water;
- Apply manual pressure to cramped muscles;
- Once spasms disappear, you may return to work;
- Seek medical attention if symptoms are not alleviated or if more serious problems are indicated.

2.3 Heat Exhaustion

2.3.1 Treatment of heat exhaustion includes:

- Get out of the sun to a cool location and drink cool water, a little at a time;
- Remove or loosen tight clothing and elevate the feet;
- If you are nauseated or dizzy, lie down;
- Move the victim to a cool place, administer drinks of cool water and fan to cool;
- Seek medical attention immediately.

2.4 Heat Stroke

2.4.1 Treatment of heat stroke, or if a person's temperature exceeds 102°F (38.9 °C) includes:

- Call for immediate medical help and then try to lower the temperature as quickly as possible:
  - Apply cool (not cold) water the person's whole body, then fan the person;
  - Wrap in wet sheet;
  - If available, use cold packs under arms, neck, and ankles;
  - Body temperature is measured frequently, often constantly. To avoid overcooling, cooling is stopped when the body temperature is reduced to about 102°F (38ºC);
- Do not give aspirin or acetaminophen to reduce the temperature;
- Treat as a true medical emergency. Seek medical help immediately;
- Protect from injury during convulsion;
- Ensure that the person's airway is open;
- Transfer to a medical facility immediately.

Americas

Dehydration Chart

S3AM-113-ATT3

GUIDANCE TOOL FOR MONITORING DEHYDRATION

URINE COLORATION CHART



1 2	3 4	5 6
Target	Dehydration	Severe Dehydration
CONTINUE DRINKING WATER TO MAINTAIN CURRENT HYDRATION LEVELS.	INCREASE WATER CONSUMPTION TO IMPROVE HYDRATION LEVELS, INCREASE BREAKS FREQUENCY, TAKE BREAKS IN A COOL SHADED AREA.	STOP WORK! FIND A SHADED AREA AND BEGIN TO DRINK COOL TO ROOM TEMPERATURE WATER SLOWLY AND STEADILY.

PREVENTING DEHYDRATION

- Start hydrating at least 3 days prior to working in high heat conditions
- Always bring enough water to maintain hydration. CalOSHA requires consuming 1 quart per hour of your work shift - more may be needed

Note: This information is guidance only and should not supersede the recommendation or instruction of a personal physician or medical professional. Contact your physician or medical professional if you have a personal medical condition or take medication for a personal condition which may be adversely affected by dehydration. Urine color can be affected by medications, vitamins and or other personal health conditions.

Americas

Heat Stress Monitoring Log

S3AM-113-FM1

The purpose of this form is to monitor employees for heat illness when applicable. It is the responsibility of the Foreman or Supervisor-in-Charge to ensure that each person completes the required information.

Project Name:			**Foreman/Supervisor:**								**Work/Rest Schedule1:** IN *(min)* OUT *(min)*					
Date:	**Water Provided[1]**		**Acclimated[2]**		**Initial Vitals[3]**	**Vital Signs and Time In/Out[3]**					**Celcius ☐ / Farenheit ☐** (select one)					
Employee Name	Yes	No	Yes	No	**Vitals**	In (P_1)	Out (P_1)	**Vitals**	In (P_1)	Out (P_1)	**Vitals**	In (P_1)	Out (P_1)	**Vitals**	In (P_1)	Out (P_1)
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		

1. Each Employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.
2. Am Employee is “acclimated” if he/she has worked in a hot environment for at least 5 - 7 consecutive days. If an Employee is acclimated, check “Yes.” If an Employee is not acclimated, check “No” and reduce the “Min In” by 50 percent for that Employee until the 5 – 7 -day period is reached.
3. “Vitals” refers to Employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work and at each break period, or as specified in the Heat Stress Exposure Control Plan.

Americas

Daily Heat Illness Prevention Log

S3AM-113-FM2

Date: _____ Project: _____ Site Safety Officer: _____

☐ Light Workload ☐ Moderate Workload ☐ Heavy Workload ☐ Very Heavy Workload

ADJ. FORECASTED MORNING HIGH:_____

EXPECTED WORK REST CYCLE:_____
(USE CODE (0-SW) FROM TABLE)

ADJ. FORECASTED AFTERNOON HIGH:_____

EXPECTED WORK REST CYCLE:_____
(USE CODE (0-SW) FROM TABLE)

WORK REST CYCLE, Adjusted Temperature Method (see page 2)*

CODE	Work Rest Cycle
0	No specified requirements
1	15 minute break every 90 minutes of work
2	15 minute break every 60 minutes of work
3	15 minute break every 45 minutes of work
4	15 minute break every 30 minutes of work
5	15 minute break every 15 minutes of work
SW	Stop work

BREAK SCHEDULE

START TIME	END TIME	WATER CONSUMPTION	BREAK LOCATION

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*FOR COMPLETION BY SSO FORECASTED TEMP + ADJUSTMENT FACTORS (SEE TABLE BELOW) = ADJUSTED TEMP

Morning High Calculation: _____ +_____ =_____

Afternoon High Calculation: _____ +_____ =_____

Time of Day	
Before daily temperature peak[1]	+2°F (+1.11°C)
10 am – 2 pm (peak sunshine)	+2°F (+1.11°C)
Sunshine	
No clouds	+1°F (+0.56°C)
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F (-1.67°C)
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F (-2.78°C)
Cloudy (>7/8 cloud cover)	-7°F (-3.89°C)
Indoor or nighttime work	-7°F (-3.89°C)
Wind (*ignore if indoors or wearing CPC*)	
Gusts greater than 5 miles per hour at least once per minute	-1°F (-0.56°C)
Gusts greater than 10 miles per hour at least once per minute	+2°F (+1.11°C)
Sustained greater than 5 miles per hour	-3°F (-1.67°C)
Sustained greater than 10 miles per hour	-5°F (-2.78°C)
Humidity (*ignore if wearing CPC*)	
Relative Humidity greater than 90%	+5°F (+2.78°C)
Relative Humidity greater than 80%	+2°F (+1.11°C)
Relative Humidity less than 50%	-4°F (-2.23°C)
Chemical Protective Clothing (CPC)[2]	
Modified Level D (coveralls, no respirator)	+5°F (+2.78°C)
Miscellaneous	
Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

Apply the adjusted temperature to the below table given the anticipated Workload to determine the appropriate Work-Rest Regimen code.

Code	Work-Rest Regimen	Adjusted Temperature			
		Light Work	Moderate Work	Heavy Work	Very Heavy Work
0	No specified requirements	**< 80°F** (26.67°C)	**< 75°F** (23.88°C)	**< 70°F** (21.11°C)	**< 65°F** (18.33°C)
1	15 minute break every 90 minutes of work	**80°F – 90°F** (26.67 - 32.22°C)	**75 – 85°F** (23.88 - 29.44°C)	**70 – 80°F** (21.11 - 26.67°C)	**65 – 75°F** (18.33 - 23.88°C)
2	15 minute break every 60 minutes of work	**>90 – 100°F** (32.22 - 37.77°C)	**> 85 – 95°F** (29.44 - 35°C)	**>80 – 85°F** (26.67 - 29.44°C)	**>75 – 80°F** (23.88 - 26.67°C)
3	15 minute break every 45 minutes of work	**>100 – 110°F** (37.77 - 43.33°C)	**>95 – 100°F** (35 - 37.77°C)	**>85 – 90°F** (29.44 - 32.22°C)	**>80 – 85°F** (26.67 - 29.44°C)
4	15 minute break every 30 minutes of work	**>110 – 115°F** (43.33 - 46.11°C)	**>100 – 105°F** (37.77 – 40.55°C)	**>90 – 95°F** (32.22 - 35°C)	**>85 – 90°F** (29.44 - 32.22°C)
5	15 minute break every 15 minutes of work	**>115 – 120°F** (46.11 - 48.88°C)	**>105 – 110°F** (40.55 - 43.33°C)	**>95 -100°F** (35 - 37.77°C)	**>90 – 95°F** (32.22 - 35°C)
SW	**Stop Work**	**>120°F** (48.88°C)	**>110°F** (43.33°C)	**>100°F** (37.77°C)	**>95°F** (35°C)

°F = degrees Fahrenheit °C = degrees Celsius

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak, it can be ignored.

[2] Refer to S3AM-113-ATT1 for addition Chemical Protective Clothing (Type C – A)

****Attach copy of receipts for water purchases**

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Heat-Related Illness Prevention

Site/Project Name
Location

Month and Year prepared

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DELETE BEFORE FINALIZING: This is a template intended to provide guidance for the development of site specific Heat Illness Prevention Plans required by the 2015 update to 8 CCR 3395) and should be modified to support site specific operations. This plan is intended to work in conjunction with a Health and Safety Plan (HASP), Safe Work Plan (SWP) or Task Hazard Analysis with an Emergency Action Plan.

Risk for a heat-related illness varies based upon work activities, personal protective equipment (PPE)/clothing selection, geographical locations, personal conditions and weather conditions. To reduce the potential of developing a heat-related illness, AECOM has developed a site-specific procedure incorporating:

- AECOM's SH&E Procedure for Heat Illness Preventions (S3AM-113_PR_Heat Stress),
- California Occupational Safety and Health Administration Heat Illness Prevention Standard (Title 8 of the California Code of Regulations, Section 3395), and
- INSERT SWP, HASP, THA or supporting document

1. Planning

This section may be replaced with an actual forecast or historic data related to location/seasonal temperatures.

The Site Safety Officer (SSO) and Field Supervisor shall verify the risk of heat-related illnesses based on:

- Weather forecasts,
- Planned work activities,
- Planned PPE, and
- Personal risk factors.

The SSO and Project Manager shall also ensure the appropriate equipment and resources are available to employees at risk of a heat- related illness. Examples of necessary equipment may include (but are not limited to):

- Potable water with replenishment supply;
- Drinking cups, insulated water bottles or other small sealable container;
- Sun protection (hats, long sleeves, sunscreen, sunglasses);
- Communication method (cell phone or similar);
- Shade;
- Reliable thermometer (a simple thermometer, like those available at hardware stores, can be used to measure the outdoor "dry bulb" temperature); and
- Cooling devices such as cooling vests or misters.

INSERT HISTORICAL WEATHER DATA OR FORECASTED CONDITIONS FOR DURATION OF PROJECT.

2. Water

2.1 Provision of Water

Employees shall have access to potable drinking water. The frequent drinking of water shall be encouraged by supervisors and field team members.

- Each employee shall be provided with a minimum 2 gallons of water per 8-hour shift, free of charge.

- All water shall be fresh, pure, potable, and cool (cooler than ambient temperature).
- Water will be located as close as possible to the work area.
- Water will be stored in an environment that will ensure a cool temperature and prevent contamination.
- Replenishment Procedures:

Update this section with site specific water replenishment procedures.

  - **Fixed Site:** Replenishment water supply shall be located XXXXXXX. Employees will have access to replenishment during working hours and may be/are required to report the date, time and quantity of water taken from the replenishment supply.
  - **Mobile/Remote Work**: Mobile and remote employees may carry water bottles or smaller sealed container of water with them while they are working, and refill containers at the primary source (cooler or other designated source) during breaks or as needed.

    Containers and refill frequency shall provide for a minimum of 1 quart of water to be consumed per hour while working Water bottles or smaller sealed container do not need to be empty prior to refilling; water should always be immediately available to employees.

2.2 Dehydration Prevention

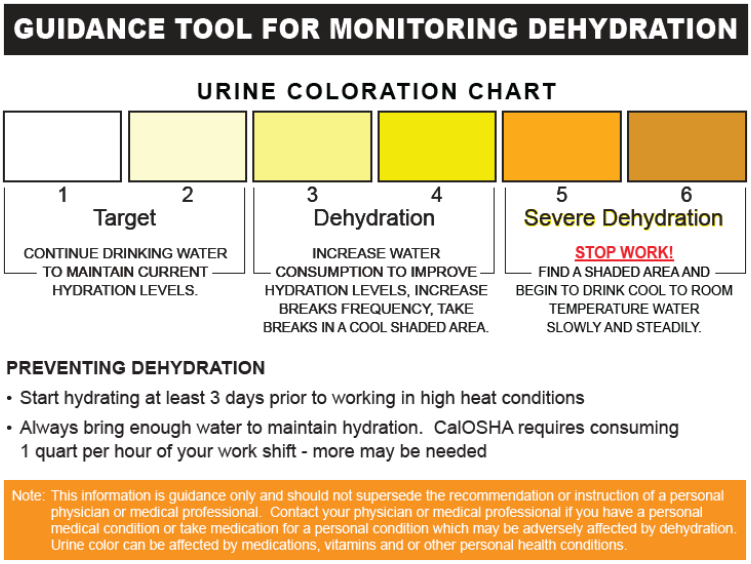
The 2006 Cal/OSHA Heat Illness Case Study showed that, although 90% of the worksites had drinking water at the site, 96% of the employees suffering from heat illnesses were dehydrated.

Dehydration occurs when the body loses too much fluid. This can happen when an employee stops drinking water and can be accelerated by work in hot or dry conditions. Not drinking enough fluids can cause muscle cramps, fainting and shock, which is a life-threatening condition.

Drinking water should increase with activity level. Dehydration can affect the body's ability to recognize thirst, so employees shall drink water on a time schedule.

In hot conditions, it is important that employees drink enough water that urination is required at least every 2 hours. Water is the best hydration fluid. If sports drinks are used, they should be diluted at least 50 percent with water prior to drinking. **Do Not Drink Distilled Water.**

Dehydration can be prevented by monitoring urine color and adjusting water intake accordingly. The following guidance was developed to aid employees in monitoring hydration levels. This tool can be downloaded from: Hydration Chart.



3. Access to Shade

This section may be replaced with a site-specific description of shade structures, locations. A map of these resources can also be included.

When temperatures **do not exceed 80 degrees Fahrenheit (°F) (26°Celsius [°C])**, access to shade for employee will be provided as needed, or as requested by employees. Timely access to shade will be provided upon an employee's request.

Shade is required when the temperature exceeds 80°F (26°C).

One or more shaded areas will be established at all times. Shade may require relocation to accommodate a moving work location.

The shaded area will either open to the air or be provided with ventilation or cooling (such as an air-conditioned vehicle). The amount of shade present shall be at least enough to accommodate the number of employees on a rest/recovery/meal/break period at any given time, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other.

The shaded area shall be located as close as practicable to the areas where employees are working, but no more than a 2.5-minute walk away. Access must be undeterred (free from obstacles or other barriers such as crossing traffic). The shaded area will be away from portable toilets, and in a clean, dry and otherwise hazard-free environment.

Examples of appropriate access to shade:

- Buildings, canopies, lean-tos, or other partial or temporary structures that are either ventilated or open to air movement.
- Trees and dense vines can provide shade that is superior to artificially provided shade and are accepted as compliant sources of shade as long as branches, thorns and the plant itself does not pose added harm to the employee.
- The interior of a vehicle may only be used to provide shade when the vehicle is air conditioned and the air conditioner is operating.

INSERT FIGURE OF SITE MAP WITH LOCATIONS OF SHADED BREAK AREAS.

4. Work-Rest Cycles and Breaks

It is necessary to implement a work routine that incorporates adequate rest periods to allow employees to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover.

The frequency and length of work breaks will be determined based on the following considerations:

- Employees are allowed and encouraged to take a preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating. The breaks will last for a minimum of 5 minutes and as long as needed to resolve any signs/symptoms of heat illness that are observed.
- The SSO may determine the timing of work breaks based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the employees, and protective clothing being used. The following guidelines shall be used to determine frequency and duration of rest breaks:

4.1 Adjusted Temperature Method

This method requires only that the ambient temperature (in °F [°C]) be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate, humidity and a fully acclimated work force). The adjustments should be made by adding or subtracting the ambient temperature reading, or changes in table position, as indicated in Table 4-1. Adjustments are independent and cumulative; all applicable adjustments should be applied. The result is the *Adjusted Temperature*, which can be compared with the values in Table 4-2 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

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Table 4-1 Temperature Adjustment Factors

Time of Day	
Before daily temperature peak[1]	+2°F (+1.11°C)
10 a.m. – 2 p.m. (peak sunshine)	+2°F (+1.11°C)
Sunshine	
No clouds	+1°F (+0.56°C)
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F (-1.67°C)
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F (-2.78°C)
Cloudy (>7/8 cloud cover)	-7°F (-3.89°C)
Indoor or nighttime work	-7°F (-3.89°C)
Wind	
Gusts greater than 5 miles per hour at least once per minute	-1°F (-0.56°C)
Gusts greater than 10 miles per hour at least once per minute	+2°F (+1.11°C)
Sustained greater than 5 miles per hour	-3°F (-1.67°C)
Sustained greater than 10 miles per hour	-5°F (-2.78°C)
Humidity	
Relative Humidity greater than 90%	+5°F (+2.78°C)
Relative humidity greater than 80%	+2°F (+1.11°C)
Relative Humidity less than 50%	-4°F (-2.23°C)
Chemical Protective Clothing (CPC)	
Modified Level D (coveralls, no respirator) [2]	+5°F (+1.11°C)
Miscellaneous	
Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

°F = degrees Fahrenheit; °C = degrees Celsius

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak, it can be ignored.

[2] Refer to S3AM-113-ATT1 for addition Chemical Protective Clothing (Type C – A)

Table 4-2 Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Frequency	Adjusted Temperature – ºF (ºC)			
	Light Work	**Moderate Work**	**Heavy Work**	**Very Heavy Work**
No Specified requirements	< 80ºF (26.67ºC)	< 75ºF (23.88ºC)	< 70ºF (21.11ºC)	< 65ºF (18.33ºC)
15-minute break every 90 minutes of work	80–90ºF (26.67–32.2ºC)	75–85ºF (23.88–29.44ºC)	70–80ºF (21.11–26.67ºC)	65–75ºF (18.33–23.88ºC)
15-minute break every 60 minutes of work	> 90–100ºF (32.22–37.77ºC)	> 85–95ºF (29.44–35ºC)	> 80–85ºF (26.67–29.44ºC)	> 75–80ºF (23.88–26.67ºC)
15-minute break every 45 minutes of work	> 100–110ºF (37.77–43.33ºC)	> 95–100ºF (35–37.77ºC)	> 85–90ºF (29.44–32.22ºC)	> 80–85ºF (26.67–29.44ºC)
15-minute break every 30 minutes of work	> 110–115ºF (43.33–46.11ºC)	> 100–105ºF (37.77–40.55ºC)	> 90–95ºF (32.22–35ºC)	> 85–90ºF (29.44–32.22ºC)
15-minute break every 15 minutes of work	> 115–120ºF (46.11–48.88ºC)	> 105–110ºF (40.55–43.33ºC)	> 95–100ºF (35–37.77ºC)	> 90–95ºF (32.2–35ºC)
STOP WORK	**> 120ºF** (48.88ºC)	**> 110ºF** (43.33ºC)	**> 100ºF** (37.77ºC)	**> 95ºF** (35ºC)

ºF = degrees Fahrenheit; ºC = degrees Centigrade

4.2 Procedures for Taking Breaks

- Breaks will be taken in a cool and/or shaded location, in an air-conditioned environment when possible. A shaded break area is required when temperatures are above 80 ºF (26ºC).
- Employees will be monitored by the supervisor or SSO and asked if he or she is experiencing symptoms of heat illness.
- Each employee should self-assess and assess their co-workers for sign/symptoms of a heat-related illness.
- Employees will be encouraged to remain in the shade.
- All breaks will last a minimum of 5 minutes in addition to the time needed to access the shade.
- Employees will not be ordered back to work until any signs or symptoms of heat illness have abated.
- Pulse rate information should be collected to verify the effectiveness of the break and work-rest cycle.
- Water will be available, and consumption encouraged in the break area.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.

4.3 Evaluating the Work-Rest Schedule's Effectiveness

Once a work-rest schedule is established, the SSO must continually evaluate its effectiveness through observation of employees for signs/symptoms of heat stress. Measurement of each employee's pulse can provide additional information in determining if the schedule is adequate and is accomplished as follows:
Within the first minute of each rest period, each employee's heart rate (pulse) can be measured and compared to the following:

- Initial heart rate: 110 beats per minute (bpm) (28 beats every 15 seconds).

Each employee's heart rate must be measured again 3 minutes later and compared to the following:

- Recovery heart rate: 80 bpm (20 beats every 15 seconds).
- If both heart rate criteria are met, the subsequent work period may be increased by one-third, provided the temperature remains constant.
- If the initial heart rate is greater than 110 bpm, or the recovery rate is not less than 80 bpm, the subsequent work shift is decreased by one-third.

If cooling devices (e.g., cooling vest) are worn, only physiological monitoring will be used to determine work activity. Measurements for each employee can be recorded and tracked throughout the workday using the Heat Stress Monitoring Log provided in S3AM-113_PR_Heat Stress.

5. Emergency Services

A minimum of two workers trained in cardio-pulmonary resuscitation (CPR) and First Aid will be present on site for all activities that expose employees to temperatures greater than 80ºF (27ºC). This is ideal, but may need to be adjusted for specific working conditions.
Means of contacting Emergency Services shall be validated in areas where cell phone reception is limited, and alternate reliable means will be selected.
Emergency Services will be activated if severe heat illness (such as, but not limited to, decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior or convulsions) is observed or suspected.
An employee that exhibits signs or symptoms of illness shall not be left alone without first aid or medical treatment to resolve symptoms.
Refer the Site-Specific Emergency Action Plan for specific emergency instructions in the Task Hazard Analysis (THAs), Safe Work Plan or Health and Safety Plan.

5.1 Acclimatization

All employees shall be closely observed by a supervisor or designee during a heat wave. For purposes of this section only, "heat wave" means any day in which the predicted high temperature for the day will be at least 80ºF (27ºC) and at least 10 ºF (5 ºC) higher than the average high daily temperature in the preceding 5 days.
An employee who has been newly assigned to a high heat area shall be closely observed by a supervisor or designee for the first 14 days of the employee's employment.

5.2 Training of Employees and Supervisors

All AECOM employees and supervisors shall receive training in the prevention of heat-related illnesses prior to starting work. Training will include:

- Environmental risk factors for heat illness, including added burden of heat load on the body caused by exertion, clothing and PPE;
- Personal Risk Factors for heat illness such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat;
- AECOM's S3AM-113_PR_Heat Stress and a review of the site-specific procedure in this Safe Work Plan, and associated THAs;
- Signs, symptoms and response measures for different types of heat-related illnesses;
- Procedure for stopping work and reporting signs and symptoms of a heat-related illness in themselves or other people on site;
- First aid measure for managing a case of heat illness;
- AECOM's procedure for responding to heat-related illnesses, including use of AECOM's Corporate Medical Provider (Work Care), and seeking emergency medical services (see the site-specific Emergency Action Plan);

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- Obtaining accurate weather forecast and ambient temperature data;
- Access to potable water, the minimum recommended consumption rate (1 quart per hour), procedure for drinking (small quantities regularly throughout the day, increase intake for higher heat, increased workload or increased sweating);
- Provision of shade required when temperatures are greater than 80ºF (27ºC);
- Acclimatization;
- How to establish a work-rest cycle per S3AM-113_PR_Heat Stress; and
- Specific high heat (95ºF [35ºC]) procedures.

6. High Heat Procedures (>95° F)

The following procedures shall be implemented when the temperature equals or exceeds 95ºF (35ºC). These procedures shall include the following to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Conduct a pre-shift meeting to review high heat procedures, encourage water consumption, and review the work-rest cycle and supplemental breaks.
- Employees shall be monitored for signs and symptoms through an effective means of observation, which may include:
    - For teams less than 20, monitoring by a supervisor or supervisor designee (SSO).
    - For teams larger than 20, monitoring via the Buddy System.
    - Regular communication through cell phone or radio of a lone worker.

Note: for Lone Worker scenario an alternate means of monitoring the worker must be devised.

- Reminders to drink plenty of water throughout the work shift shall be provided by the SSO or Site Supervisor or from peer to peer.
- Designate an employee that is authorized to call Emergency Services in the event of an emergency

7. Identifying and Responding to Sign and Symptoms

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel working in the desert. Site personnel must be instructed in the identification of heat-stress symptoms of heat-related illnesses. Employees are required to immediately report any signs of symptoms that they may experience or observe in fellow employees. The guidance below in Table 7-1 will be used in identifying and responding to heat-related illness. Any employee exhibiting a sign or symptom of a heat-related illness shall receive appropriate first aid or medical care through the AECOM supervisor, and AECOM's Incident Reporting process.

Table 7-1 Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Dehydration	*96% of the employees suffering from heat illnesses were dehydrated.* Dehydration results from in taking less water than your body is using (sweating). Dehydration results in reduced urine output, dark-colored urine, shriveled skin that doesn't "bounce back" when pinched, extreme thirst (not always), sleepiness, lack of sweat, dry skin, headache, constipation.	• Stop work and move employee to shaded rest/break area. • Drink water, slowly and steadily. • Report to SSO, contact Safety Professional/Work Care for guidance on fluid intake and returning to work.
Heat Rash	A heat rash occurs when sweat ducts become clogged and the sweat can't get to the surface of the skin. Instead, it becomes trapped beneath the skin's surface causing a mild inflammation or rash.	Avoid working in hot, humid weather, wear loose clothing made of breathable fabrics like cotton, use air conditioning, and keep the skin clean with frequent baths or showers to prevent sweat glands from becoming clogged. Change clothing that is wet or soiled. Heat rash can be treated by cleaning and cooling the area with cool water and applying an over-the-counter hydrocortisone cream. There is risk of infection from heat rash if sweat glands become infected. The signs of infection include pain, increased swelling, and redness that does not resolve. Pustules may form at the site of the rash. This infection occurs because bacteria have invaded the blocked sweat gland. Antibiotic treatment may be required. Chronic and recurrent heat rash may need to be treated by a health care practitioner or dermatologist (skin specialist).
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • An air-conditioned spot is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (*avoid drafts or sudden chilling*). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (*Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing.*) • If the victim is conscious, it may be helpful to give him/her sips of water. • Transport victim to a medical facility as soon as possible.

Type of Heat-Related Illness	Description	First Aid
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, and nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly, and death is imminent if exposure continues. Heat stroke can occur suddenly.	• Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back with the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide on-site treatment of the victim and proper transport to a medical facility.

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Americas

Heavy Equipment

S3AM-309-PR1

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near heavy equipment and heavy equipment operation.

1.2 Military related vehicles and equipment (e.g. tanks) are not covered under this standard.

1.3 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Heavy equipment** –All excavating equipment (e.g. scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, graders, agricultural and industrial tractors, etc.), cranes, lift trucks, drills, etc. This may include off-highway trucks (e.g. dump truck, heavy haul truck, etc.). For requirements related to crew trucks refer to *S3AM-005-PR1 Driving*.

2.2 **Operator** – Any person who operates the controls while the heavy equipment is in motion or the engine is running.

2.3 **Ground personnel/workers** – Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 References

3.1 S3AM-005-PR1 Driving

3.2 S3AM-202-PR1 Competent Person Designation

3.3 S3AM-213-PR1 Subcontractor Management

3.4 S3AM-303-PR1 Excavation

3.5 S3AM-322-PR1 Overhead Lines

3.6 S3AM-325-PR1 Lockout Tagout

3.7 S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for confirming all equipment is in good working order and all equipment operators are verified as qualified on the piece of machinery they are assigned.
- As applicable, review as-built drawings.
- Maintain operation manuals at the site for each piece of equipment that is present on the site and in use.
- Maintain a list of operators for the project, and the specific equipment that they are authorized to operate.
- Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.

- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Confirm subcontractors are properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management.*
- Require that subcontractor employees follow established safety procedures in operation, inspection, and maintenance of vehicles and equipment.
- Inform AECOM and subcontractor machinery operators about applicable local regulations restricting the consecutive minutes of engine idling time allowed.
- Confirm subcontractor machinery and mechanized equipment is approved for use in accordance with the requirements of *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*.
- Confirm that all rented equipment bears any required current certification marks and arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Confirm that AECOM and subcontractor machinery and mechanized equipment is certified, as applicable, in accordance with manufacturer specifications and/or regulatory requirements.
- Visually observe the subcontractors' vehicles and equipment, for any unsafe conditions or practices. Equipment or operation not in compliance with applicable safety standards is prohibited.

4.1.2 **Employees / Ground Personnel**

- Confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Ground personnel when working in the vicinity of heavy equipment shall have received training, and comply with the applicable rules of engagement.

4.1.3 **Operators (of heavy equipment)**

- Operate the equipment safely, maintain full control of the equipment, and comply with manufacturer's operation manual and the laws governing the operation of the equipment.
- Inspect equipment and immediately report defects and conditions affecting the safe operation of the equipment to the appropriate Supervisor.
- Trainees may operate equipment in accordance with jurisdictional requirements and under the direct supervision of a trainer.

4.2 Communication

4.2.1 Communication between site Managers / Supervisors, heavy equipment Operators, and site Employees / Ground Personnel is a key method of preventing serious injury or death during heavy equipment operations.

4.2.2 Managers shall confirm the Industrial site or project specific SH&E Plan is developed and communicated to all affected and involved employees. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.3 Task Hazard Assessments and Daily Tailgate meetings shall be conducted in accordance with *S3AM-209-PR1 Risk Assessment & Management.*

4.2.4 Concerning worksites in which other employers control concurrent operations and SH&E issues related to the worksite, the manager shall coordinate with those conducting concurrent operations to confirm appropriate control measures are in place to protect employees from the hazards associated with activities to be performed.

- Coordination shall occur prior to work commencing, periodically thereafter, and as necessary given changes in scope and/or working conditions.
- Affected employees (including managers and supervisors) shall seek to participate in all site SH&E meetings related to concurrent operations.

4.2.5 The following points outline the communication requirements during heavy equipment operations:

- Site Supervisors/t Managers shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.
- Site Supervisors/ Managers shall inform all ground personnel before changes are made in the locations of designated work areas.
- Prior to work initiating on site, the Site Supervisor/ Manager is to confirm all operators and ground personnel are trained on the hand signals that will be used to communicate between operators and ground personnel.
- Ground Personnel working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (e.g., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a signal person shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.3 Ground Personnel

4.3.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.3.2 The following points outline the clearance requirements during heavy equipment operations:

- Ground Personnel shall always yield to heavy equipment.
- Ground Personnel shall maintain a suitable “buffer” area of clearance from all active heavy equipment.
- A task hazard assessment that identifies any special precautions shall be completed and communicated to all AECOM personnel associated with or affected by the activity.
- Site Supervisors/ Managers shall designate areas of heavy equipment operation and confirm that all ground personnel are aware of designated areas.
    - Designated areas shall include work zone boundaries and travel routes for heavy equipment.
    - Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
    - Work zone boundaries shall consider line of fire hazards related to the equipment and associated activities. Refer also to *S3AM-309-ATT2 Operator Line of Sight.*
    - If working near heavy equipment, Ground Personnel shall stay clear of loads to be lifted or suspended loads, and out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
    - During winch use, all swampers or other personnel will remain outside the “whip area” of the winch line or tow cable.

- At a minimum, employees shall maintain a distance of at least two pile lengths from where piles are being cut and dropped, other than in situations where cut piles are being guided to the ground utilizing mechanical means (e.g., pile driver and shackle) to control the direction and speed of fall of the cut pile.

- When feasible, Site Supervisors/ Managers shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and confirm that unauthorized ground personnel do not enter such areas.
- Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
- Ground Personnel shall never stand between two pieces of operating heavy equipment or other objects (e.g., steel support beams, trees, buildings, etc.).
- Ground Personnel shall never stand directly below heavy equipment located on higher ground unless it can be verified ground stability is not a factor and grade of slope is such that it would not contribute to equipment tip-over.
- Ground Personnel may only enter the swing area, work area or path of travel of any operating equipment when:
  - They have attracted the operator's attention and established eye contact, and
  - The operator has idled the equipment down, placed it in neutral, grounded engaging tools, set brakes and communicated entry is permitted.
- Employees shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- Employees shall not talk, text, or otherwise use a cell phone while standing or walking on a roadway or other heavy equipment path.

4.3.3 At a minimum, all Ground Personnel and Operators outside of heavy equipment shall wear the following:

- High visibility safety vest (fluorescent background material and retro-reflective striping) meeting jurisdictional requirements that is visible from all angles.
  - Background material: should be fluorescent yellow-green, fluorescent orange-red or fluorescent red.
  - Combined-performance retro-reflective material (e.g. the stripes): should be fluorescent yellow-green, fluorescent orange-red or fluorescent red - and shall be in contrast (that is, have a distinct color difference) to the background material.
  - Hazards may require high visibility garments that cover torso, legs and arms.
  - Confirm that vest is not faded or covered with outer garments, dirt, etc.
- American National Standards Institute/Canadian Standards Association- (ANSI/CSA-) approved hard hat
- ANSI/CSA-approved safety glasses with side shields
- At a minimum, CSA or ASTM approved, high-cut (min. 6"), puncture, impact and compression resistant footwear.
- ANSI/CSA-approved hearing protection as needed
- Appropriate work clothes (e.g., full-length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).

4.4 Prior to work commencing

4.4.1 All heavy equipment will be inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.

- Roll-over protection systems (ROPS) and appropriate overhead protection (Fall Object Protection FOP) shall be in place given the specific equipment requirements. Utilize equipment with enclosed cabs where feasible or accessible.
    - Where use of equipment with enclosed cabs is not feasible or said equipment is not accessible, operators shall use any additional personal protective equipment determined as necessary (e.g. goggles, additional hearing protection, etc.).
- Equipment operated in hazardous atmosphere environments shall be equipped with the proper safety equipment (e.g., spark arrestors, positive air shut off, etc.).
- Operation of equipment that has or had cab glass (per the manufacturer's specifications) that is cracked/broken (obstructing the operator's view) or missing is prohibited.
- A locking device shall be provided that will prevent the accidental separation of towed and towing vehicles on every fifth-wheel mechanism and two-bar arrangement.
- Trip handles for tailgates of dump trucks and heavy equipment shall be arranged so that when dumping, the operator will be in the clear.
- The Operator will report defects and conditions affecting the safe operation of the equipment to the Site Supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.
- Exposed moving parts on heavy equipment (belts, gears, shafts, pulleys, sprockets, spindles, drums, fan belts, flywheels, chains, or other reciprocating, rotating or moving parts) which are a hazard to the operator or to other workers will be guarded.
    - If a part will be exposed for proper function it will be guarded as much as is practicable consistent with the intended function of the component.

4.4.2 An approved 4A40BC fire extinguisher shall be present on all heavy equipment. An approved 4A40BC fire extinguisher of appropriate rating shall be present and readily accessible on all heavy equipment.

- Fire extinguishers shall be inspected by the operator prior to heavy equipment operation each shift. Monthly and annual inspections shall be documented.

4.4.3 All Operators shall inspect the area adjacent to the machine prior to starting.

- Evaluate ground conditions, concurrent operations and obstructions to identify approved routes of travel and work areas.
- As applicable, check that there is sufficient swing room and that the outriggers are adequately supported on solid and stable ground

4.4.4 Managers / Supervisors shall inform the operators of the equipment that AECOM employees are in the area and inquire if there are any restricted areas or specific rules or requirements. In some industrial facilities, heavy equipment has the 'right of way'.

4.4.5 Where the Operator will not have a full view of the path of travel, a signal person will be used on the ground that has a full view of the load, the operator, and the path.

4.4.6 All heavy equipment with limited visibility (operator cannot directly or by mirror or other effective device see immediately behind the machine) operated around workers or on a construction site:

- Shall have an audible back-up alarm installed that functions automatically when the vehicle or equipment is put into rear motion.

- All bi-directional equipment shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction.
- Backing up or movement in both directions for bidirectional equipment shall occur only when a signal person communicates that it is safe to do so if alarms or horns are not feasible.

4.5 Operation

4.5.1 The Operator of heavy equipment is the only worker permitted to ride the equipment unless the equipment is equipped by the manufacturer for passengers. Manufacturer operator's manual shall be complied with.

4.5.2 A person will not operate heavy equipment unless the person has received adequate instruction and training in the safe use of the equipment, and has demonstrated to a qualified supervisor or instructor competency in operating the equipment.

- Oilers, apprentices, and other operators will not be allowed to operate equipment unless authorized by the Manager.

4.5.3 The Operator of heavy equipment will operate the equipment safely, maintain full control of the equipment, and comply with the manufacturer's operator manual and the laws governing the operation of the equipment.

- Operation of company-owned, leased, or rented vehicles or equipment while under the influence of alcohol or illegal drugs or otherwise impaired is prohibited.
- Do not operate any equipment beyond its safe load or operational limits.
- Operator shall not talk on, text, or otherwise use mobile phones while operating heavy equipment.
- Never use bucket teeth or boom for lifting or moving heavy objects.

4.5.4 When heavy equipment is used for lifting or hoisting or similar operations there shall be a permanently affixed notation stating the safe working load capacity of the equipment and the notation shall be kept legible and clearly visible to the operator.

4.5.5 A Supervisor or Manager will not knowingly operate or permit a worker to operate heavy equipment which is, or could create, an undue hazard to the health or safety of any person. Where compliance is refused, the Manager or his or her designate should be notified immediately.

4.5.6 The Operator of heavy equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement.

- The Operator is not to leave suspended load, machine or part or extension unattended, unless it has been immobilized and secured against inadvertent movement.
- Turn off heavy equipment, place gear in neutral and set parking brake prior to leaving vehicle unattended.
- Buckets and blades are to be placed on the ground and with hydraulic gears in neutral when not in use.
- Brakes shall be set and, as necessary, wheels chocked or equivalent (as applicable) when not in use.

4.5.7 The Operator will maintain the cab, floor and deck of heavy equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.

4.5.8 If heavy equipment has seat belts required by law or manufacturer's specifications, the Operator and passengers will use the belts whenever the equipment is in motion, or engaged in an operation which could cause the equipment to become unstable.

- Seat belts shall be maintained in functional condition, and replaced when necessary to ensure proper performance.

4.5.9 All vehicles transporting material or equipment on public roads shall comply with local laws pertaining to weight, height, length, and width. Obtain any permits required for these loads.

4.5.10 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.

4.5.11 Never exit heavy equipment while it is in motion.

4.5.12 Do not ride with arms or legs outside of the truck body of equipment cab.

- Never ride on the outside of a piece of heavy equipment (e.g. in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck bed, on the load, bucket, etc.).

4.5.13 Have vehicle headlights on at all times when driving in the area.

4.5.14 Park motor vehicles off the haul roads, or away from the work areas.

4.5.15 Do not wear loose clothing or jewelry where there is a danger of entanglement in rotating equipment.

4.5.16 Do not enter the swing area of machines such as cranes, heavy drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so. Refer to *S3AM-309-ATT2 Operator Line of Sight.*

4.5.17 Stay out of the blind areas around heavy equipment and never assume that the equipment operators have seen you or are aware of your presence.

4.5.18 Maintain a distance of at least 2 feet (60 centimeters) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, a spotter shall observe and be in constant communication with the operator to prevent contact.

4.5.19 Vibrations from moving traffic or heavy equipment can cause excavations or spoil piles to become unstable.

- Excavation activity shall be conducted according to *SOP S3AM-303-PR1 Excavation*.
- Equipment not involved in the excavating activity or not required to be in the vicinity shall keep clear. Equipment that shall operate in the vicinity shall maintain appropriate setback distances from edges of excavations or spoil piles.

4.5.20 All heavy equipment shall be operated in a safe manner that will not endanger persons or property.

- When ascending or descending grades in excess of 5 percent, loaded equipment shall be driven with the load upgrade.
- When operating an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating, refer to the *S3AM-309-ATT1 Brokk 180* for more specifics.

4.5.21 All heavy equipment shall be operated at safe speeds. Do not drive any vehicle at a speed greater than is reasonable and safe for weather conditions, traffic, intersections, width, and character of the roadway, type of motor vehicles, and any other existing condition.

4.5.22 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.

4.5.23 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.

4.5.24 When feasible, Operators shall travel with the “load trailing”, if the load obstructs the forward view of the operator.

4.5.25 Slow down and sound horn when approaching a blind curve or intersection. Signal people equipped with 2-way radio communications may be required to adequately control traffic.

4.5.26 All haulage equipment / trucks, whose payload is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cable shield and/or canopy adequate to protect the operator from shifting or falling material. If protection is not available for the operator, the operator shall leave the vehicle and wait in a designated safe location until it is loaded..

4.5.27 Equipment shall be shut down prior to and during fueling.

- Confirm proper grounding/ bonding between equipment and fuel vehicle prior to fueling operations.
- During fuel operations confirm fuel nozzle remains in contact with the tank.
- Do not smoke, use electrical devices or have an open flame present while fueling.
- Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.

4.5.28 Site vehicles will be parked in a designated parking location away from heavy equipment.

4.5.29 Operators shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.

4.5.30 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.

4.5.31 Equipment left unattended at night adjacent to travelled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (1.8m) (or the regulatory requirement for the work location) to the active roadway.

4.5.32 Rubber / pneumatic-tired earthmoving haulage equipment shall be equipped with fenders on all wheels. Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

4.5.33 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not to be exceeded.

4.5.34 Steering or spinner knobs shall not be attached to steering wheels.

4.5.35 High-lift rider industrial trucks shall be equipped with overhead guards.

4.5.36 All hot surfaces of equipment, including exhaust pipes or other lines, that present a possible injury or fire hazard, shall be guarded or insulated.

4.5.37 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

4.5.38 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

4.5.39 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.5.40 In an effort to reduce air emissions, fuel costs, and run-time hours (that can impact equipment warranty), operators shall limit heavy equipment engine idling to not more than five consecutive minutes. Local regulations at the location of the vehicle operation could require less than five consecutive minutes idling time. The idling limit does not apply to:

- Idling when queuing.
- Idling to verify that the vehicle is in safe operating condition.

- Idling for testing, servicing, repairing or diagnostic purposes.
- Idling necessary to accomplish work for which the vehicle was designed (cranes, man-lifts, forklifts, etc.)
- Idling required to bring equipment/vehicle to operating temperature, as specified by the manufacturer. Engine heaters shall be used for cold weather starting to avoid engine idling where feasible.
- Idling necessary to ensure safe operation of the vehicle.
- Idling to keep equipment (including windows) clear of ice and snow.
- Idling to provide air conditioning or heat to ensure the health and safety of the operator, but only when seated inside the equipment or vehicle.

4.6 Utilities

4.6.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. Refer to the *S3AM-322-PR1 Overhead Lines* procedure for more specifics.

4.6.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities.
- Confirm all equipment (e.g., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath aboveground utilities.
- Confirm utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work. Confirm documentation of the contact is made; date, number; contact name, organization, etc. Refer to *SOP S3AM-303-PR1 Excavation* and *S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance.*

4.7 Training

4.7.1 The Operator or other qualified supervisor will provide all on-site personnel with an orientation to the heavy equipment and its associated hazards and controls.

4.7.2 Only designated, qualified personnel shall operate heavy equipment.

4.7.3 Operators shall have all appropriate jurisdictional licenses or training to operate a designated piece of heavy equipment.

4.7.4 Operators shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is required. Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.8 Inspection and Maintenance

4.8.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel regulatory agencies upon request during work hours.

4.8.2 Maintenance records will be maintained on the site or project for heavy equipment.

4.8.3 Conduct maintenance as prescribed by the manufacturer in the Operation Manual for each piece of equipment.

4.8.4 Servicing, maintenance and repair of heavy equipment will not be done when the equipment is operating.

- Lockout and tagout safety procedures are followed. Refer to *S3AM-325-PR1 Lockout Tagout*.

- Motors are turned off, unless required for performing maintenance or repair.
- All ground-engaging tools are grounded or securely blocked.
- Controls are set in a neutral position and brakes are set.
- Electrically driven equipment is installed with provision for tagging and locking out the controls while under repair.
- Manufacturer's requirements for maintenance and repair are followed.
- If continued operation is essential to the process, a safe means of protection shall be provided.
- Provide and use a safety tire rack, cage, or equivalent protection when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

4.8.5 All heavy equipment shall have a documented inspection and if necessary, repaired prior to use.

- Operators shall not operate heavy equipment that has not been cleared for use.
- All machinery and mechanized equipment will be verified to be in safe operating condition (refer to *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*) by a competent person (refer to *S3AM-202-PR1 Competent Person Designation*) within seven days prior to operation on a new site or project. Clearance is valid for up to one year for the given site or project.
- As applicable, all machinery and mechanized equipment shall be inspected / certified and tested at appropriate intervals as required by the manufacturer and/or regulatory requirements.

4.8.6 All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the Supervisor/ Manager immediately.

- Defective heavy equipment shall be immediately tagged and taken out of service until repaired.
- Inspection, maintenance, service and repair records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use *S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist*.
- Records shall be made available for review upon request. Note: Documents may be electronically stored in the project files.

4.9 Fueling and batteries

4.9.1 A well-ventilated area shall be used for refueling.

4.9.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.

4.9.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.

4.9.4 If there is potential to spill fuel on hot surfaces, the surfaces shall be permitted to cool down prior to fueling. Any spillage shall be cleaned before starting engine.

4.9.5 Spilled fuel shall be cleaned with cotton rags or cloths and disposed of in the proper receptacle; do not use wool or metallic cloth.

4.9.6 Open flames, lighted smoking materials, sparking equipment or any other type of ignition source shall remain a minimum of 35' (10.7m) from the fueling area and/or fuel source. This clearance shall be increased if required or conditions warrant.

4.9.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.

4.9.8 Portable containers to be filled shall be placed directly on the ground or be properly grounded prior to filling to prevent creation of a static charge. Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.

4.9.9 Control electrostatic hazards.

- Before activating fuel pump, touch some part of vehicle / equipment to de-energize any static electricity that may be present.
- The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent build-up of a static charge.

4.9.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

4.9.11 Batteries shall be serviced in a ventilated area while wearing appropriate Personal Protective Equipment.

4.9.12 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first. Consult the SDS applicable to the battery and/or contents for additional information including; handling, precautions, and first aid measures.

- Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water. Battery storage or maintenance areas shall have readily accessible eye wash stations.
- Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention shall be sought immediately.

4.9.13 When installing a battery, the battery shall be connected ground post last.

4.9.14 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.

4.9.15 When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.

4.9.16 To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around batteries by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least a minimum of 35 feet (10.7 meters) away from battery-charging stations.

5.0 Records

5.1 Inspection, maintenance, service and repair records shall be maintained with the equipment.

6.0 Attachments

6.1 S3AM-309-ATT1 Brokk180 Safety Card

6.2 S3AM-309-ATT2 Operator Line of Sight

6.3 S3AM-309-FM1 Approval of Machinery & Mechanized Equipment

6.4 S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist

6.5 S3AM-309-FM3 Rubber Tire Backhoe Operator Skill Evaluation

6.6 S3AM-309-FM4 Scraper Operator Skill Evaluation

6.7 S3AM-309-FM5 Bull Dozer Operator Skill Evaluation

6.8 S3AM-309-FM6 Dump Truck Operator Skill Evaluation

6.9 S3AM-309-FM7 Roller Compactor Operator Skill Evaluation

6.10 S3AM-309-FM8 Front End Loader Operator Skill Evaluation

6.11 S3AM-309-FM9 Grader Operator Skill Evaluation

6.12 S3AM-309-FM 10 Excavator Operator Skill Evaluation

6.13 S3AM-309-FM11 Water Truck Operator Skill Evaluation

6.14 S3AM-309-FM12 Heavy Equipment Maintenance Inventory

6.15 S3AM-309-FM13 Heavy Equipment Inspection Report

Americas

Brokk 180

S3AM-309-ATT1

1.0 Objective/Overview

1.1 The Brokk 180 is an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating. This machine includes attachments designed exclusively for demolishing work (e.g., grapple, bucket, hydraulic hammer, etc.). By using the remote control unit, an operator can move the machine and attachments in different directions and speeds from afar.

2.0 Potential Hazards



2.1 Flying debris

2.2 Crush/impact/pinch from extendable boom, tracks, and tipping over

2.3 Struck-by

2.4 Electricity (subsurface utilities when excavating)

2.5 Gas lines (subsurface utilities when excavating)

2.6 Noise

3.0 Safe Operating Guidelines

3.1 Prior to use, complete a pre-operation inspection to determine if the unit is in safe working condition.

3.2 Position the unit to safely perform the intended task, then deploy the outriggers to stabilize the unit.

3.3 Confirm that the operator knows what the lifting capacity is; do not exceed the lifting capacity.

3.4 Complete a subsurface utility clearance prior to excavating.

3.5 Operator should define a swing radius area and exclude workers from the area. Establish a minimum 15-foot (4.5-meter) clearance around the unit while operating.

3.6 Do not allow debris to build up around the unit. Maintain good housekeeping practices.

3.7 Prior to removing debris from under the boom, stop, disengage the unit, and position the boom so that the attachment is at rest on the ground.

3.8 Personnel operating the unit with the remote control device will be properly trained and certified by a competent person.

3.9 The operator will be able to maintain line of sight visual contact with the unit at all times to assess hazards and site security.

3.10 Maintenance in excess of preventive maintenance activities (e.g., lubrication, replenishing fluids, etc.) will be performed by manufacturer personnel ONLY.

3.11 All operations will comply with the manufacturer's recommended policies.

4.0 Training Requirements

4.1 Review of applicable Standard Operating Procedures.

4.2 Complete knowledge and understanding of remote control functions.

4.3 Review and follow manufacturers' recommended policies and practices.

5.0 Personal Protective Equipment

5.1 Class II (minimum) American National Standards Institute/Canadian Safety Association Safety Vest

5.2 Hard Hat

5.3 Safety Toe Boots

5.4 Safety glasses with side shields

5.5 Hearing protection (ear plugs and/or ear muffs)

5.6 Leather gloves

6.0 Other Safety Tips

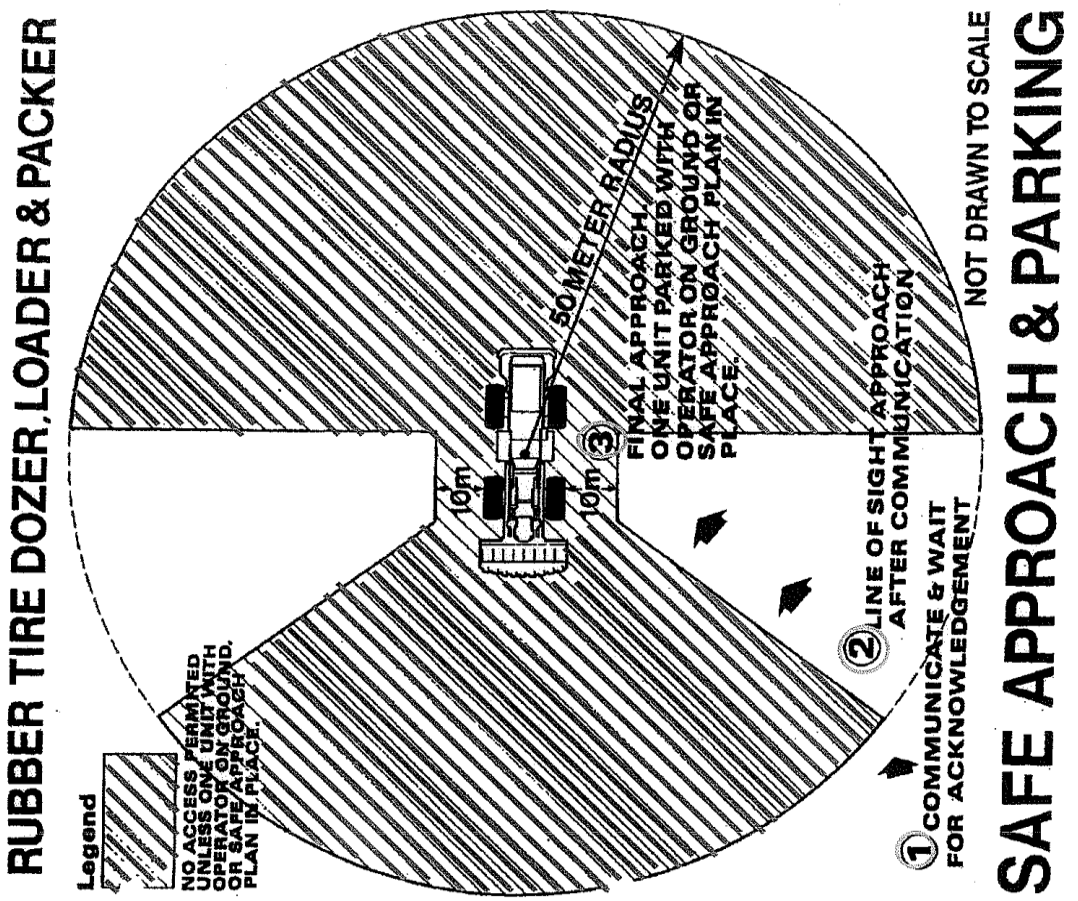
6.1 Never stand under a raised boom.

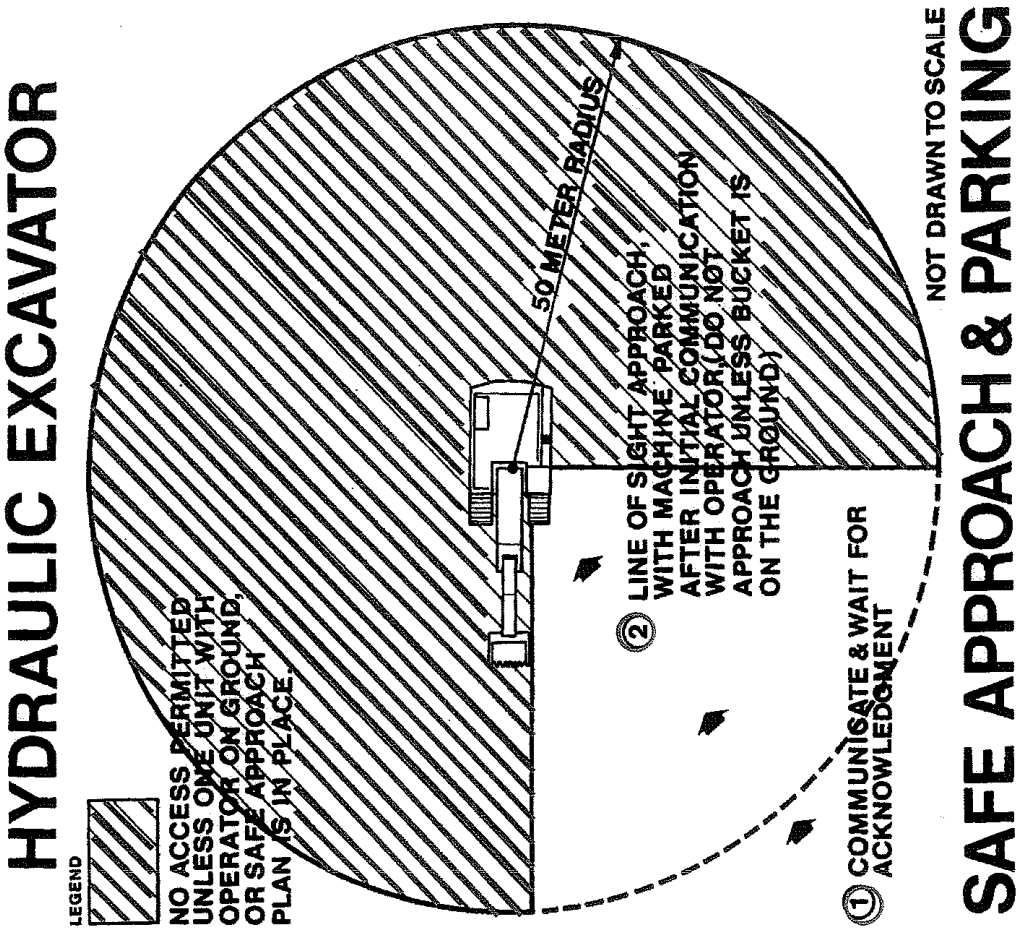
6.2 Pay close attention to power cords for potential tripping hazard and equipment entanglement.

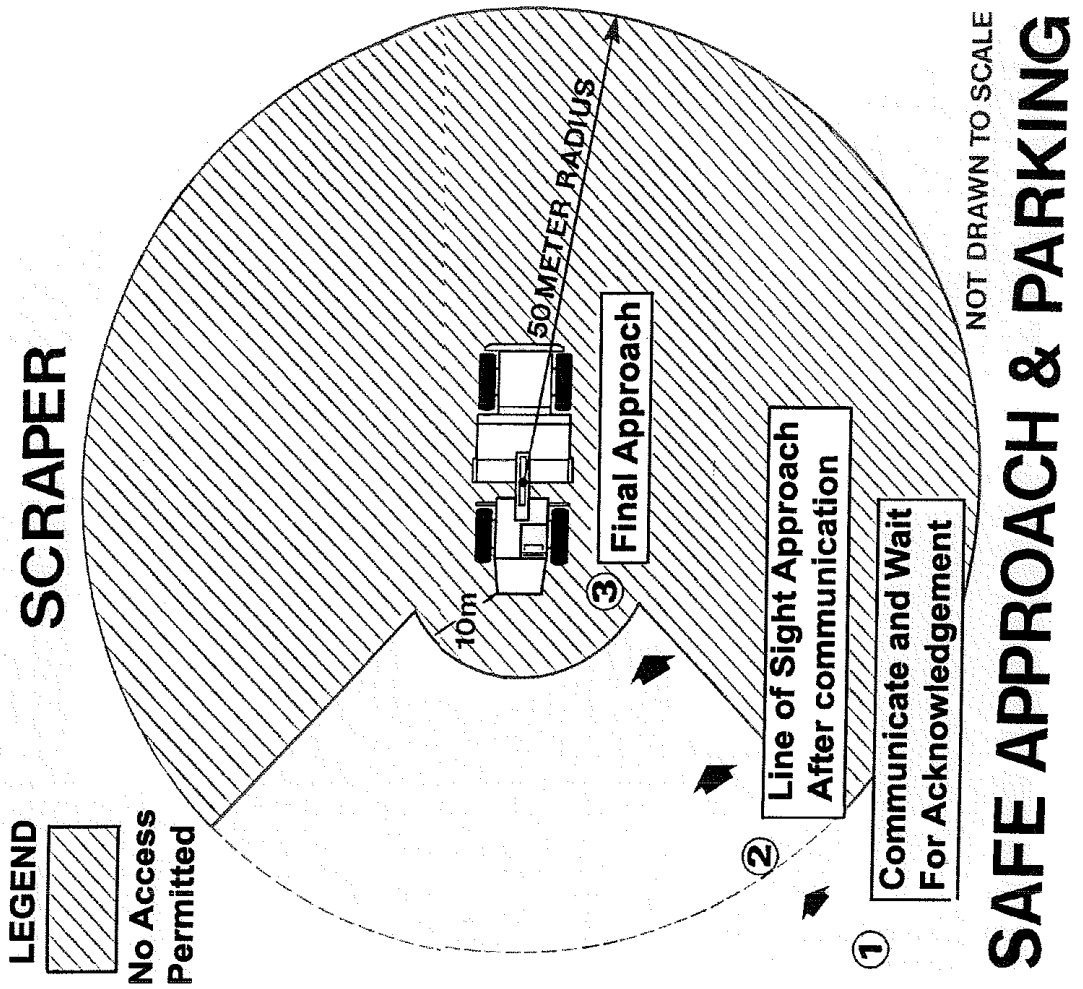
Americas

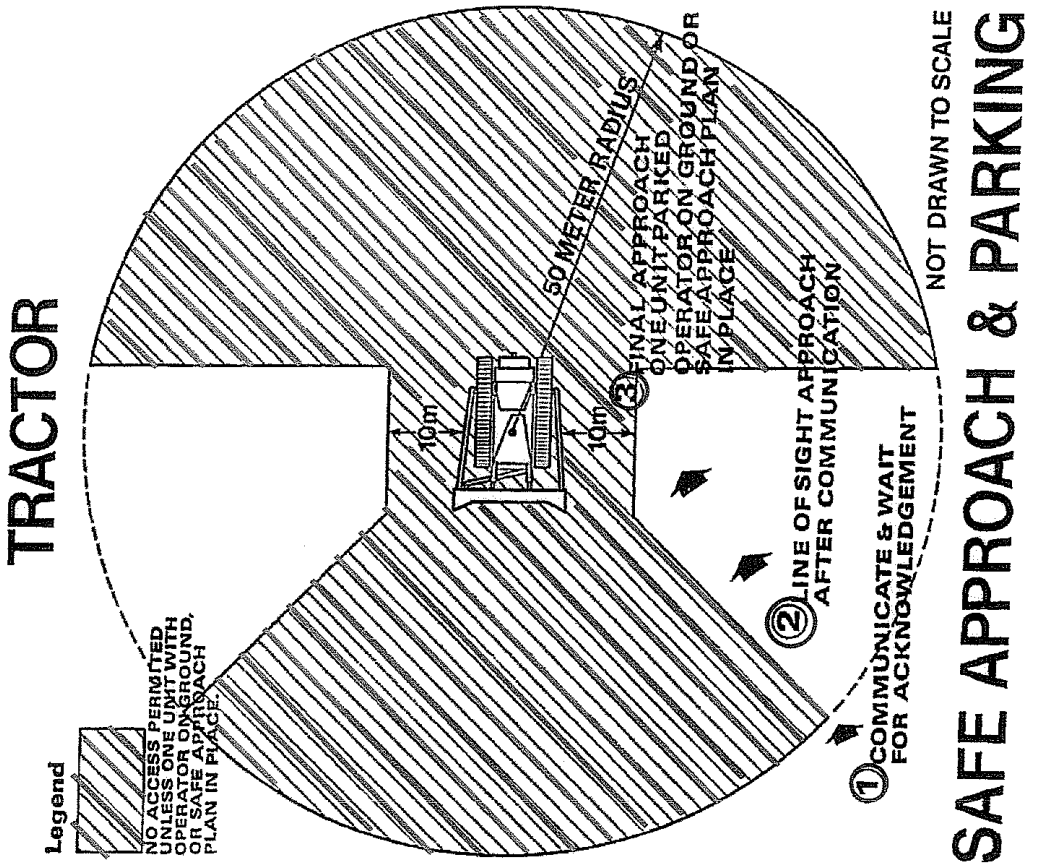
Operator Line of Sight

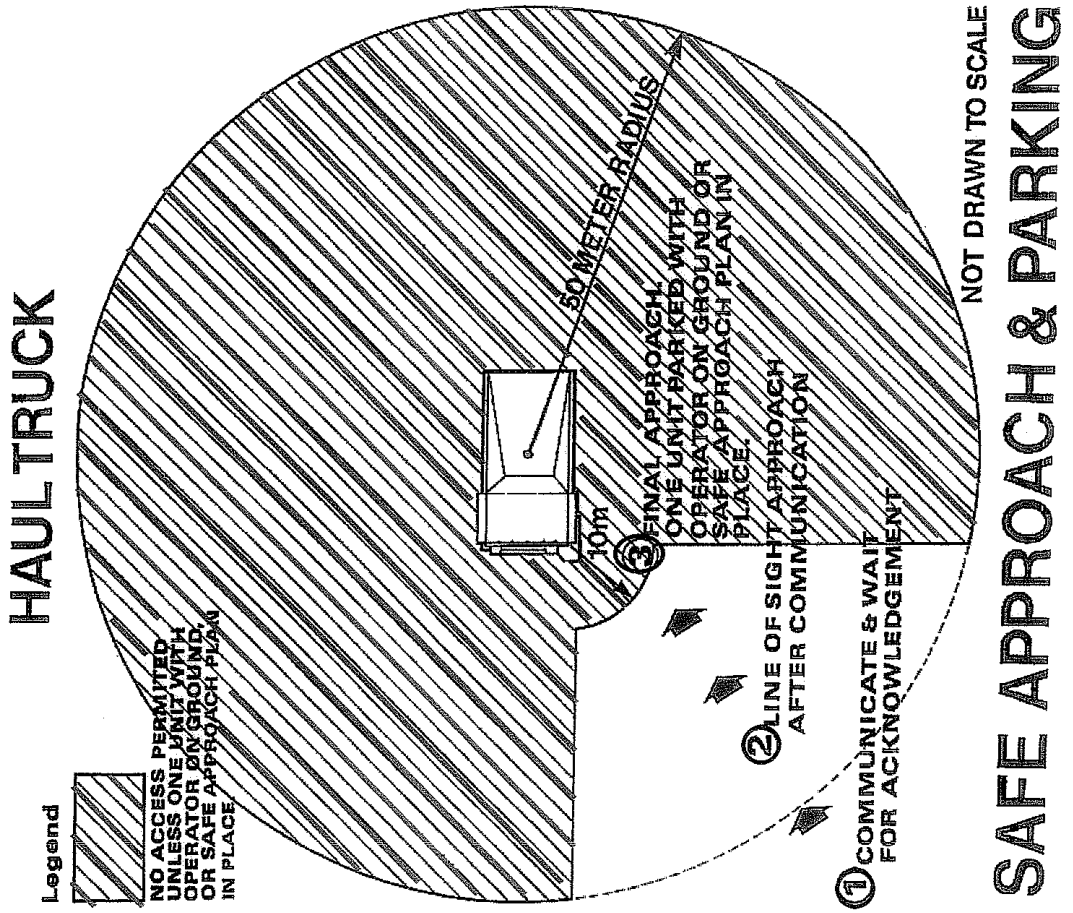
S3AM-309-ATT2

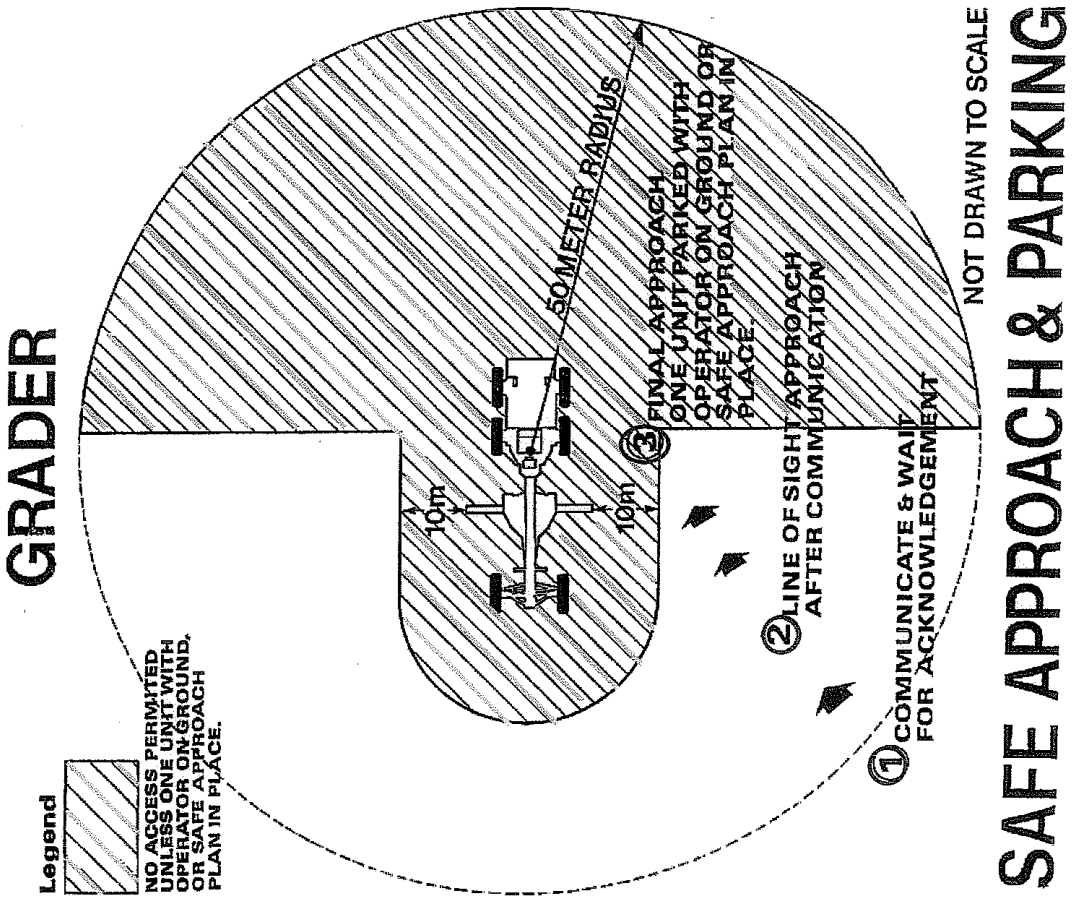



HYDRAULIC EXCAVATOR
LEGEND
NO ACCESS PERMITTED UNLESS ONE UNIT WITH OPERATOR ON GROUND, OR SAFE APPROACH PLAN IS IN PLACE.
50 METER RADIUS
② LINE OF SIGHT APPROACH, WITH MACHINE PARKED AFTER INITIAL COMMUNICATION WITH OPERATOR. DO NOT APPROACH UNLESS BUCKET IS ON THE GROUND.)
① COMMUNICATE & WAIT FOR ACKNOWLEDGMENT
NOT DRAWN TO SCALE
SAFE APPROACH & PARKING

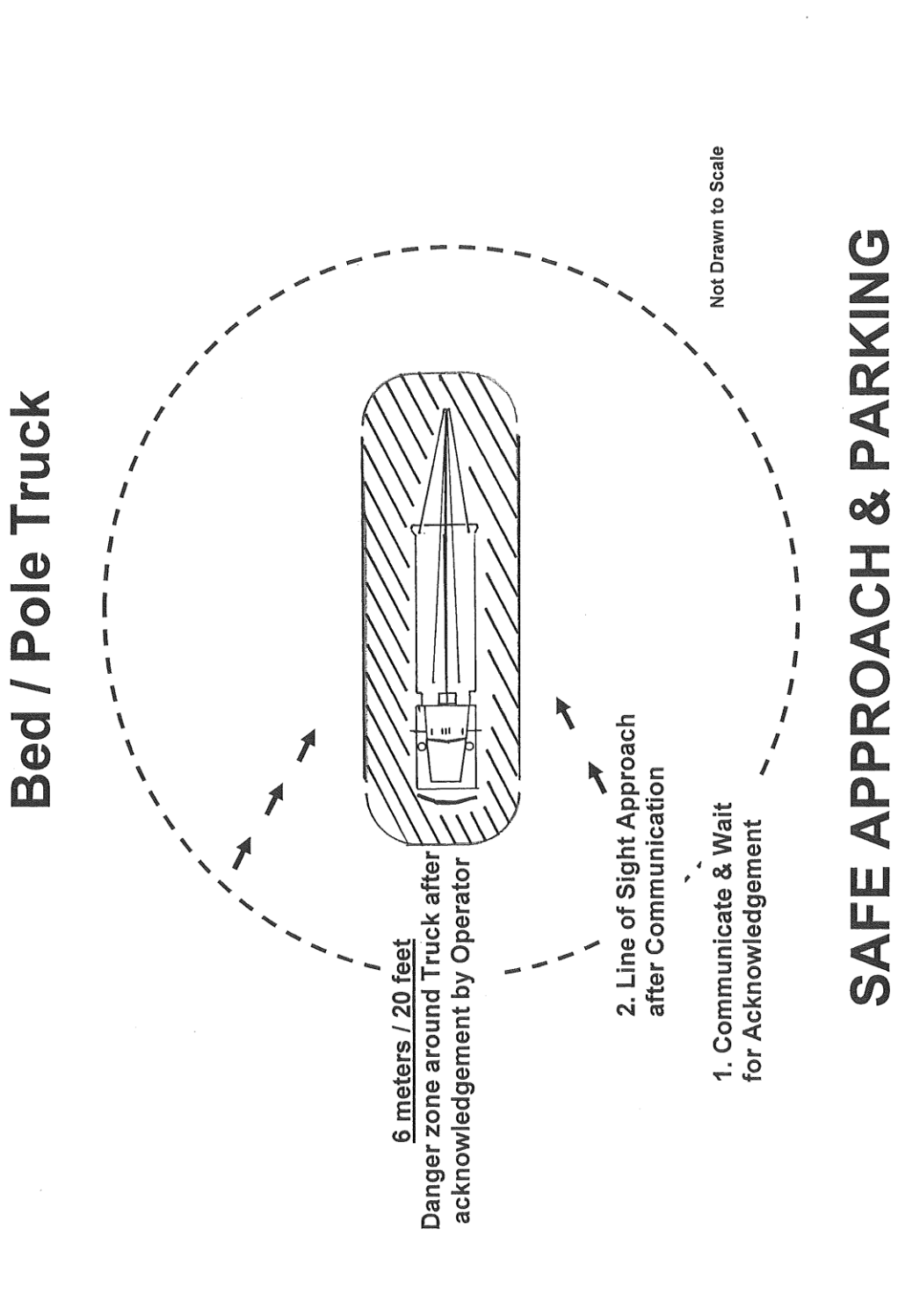

SAFE APPROACH & PARKING
NOT DRAWN TO SCALE
SCRAPER
50 METER RADIUS
10m
1 Communicate and Wait For Acknowledgement
2 Line of Sight Approach After communication
3 Final Approach
LEGEND
No Access Permitted


SAFE APPROACH & PARKING
NOT DRAWN TO SCALE
TRACTOR
50 METER RADIUS
10m
10m
③ FINAL APPROACH ONE UNIT PARKED OPERATOR ON GROUND OR SAFE APPROACH PLAN IN PLACE
② LINE OF SIGHT APPROACH AFTER COMMUNICATION
① COMMUNICATE & WAIT FOR ACKNOWLEDGEMENT
Legend
NO ACCESS PERMITTED UNLESS ONE UNIT WITH OPERATOR ON GROUND, OR SAFE APPROACH PLAN IN PLACE


SAFE APPROACH & PARKING
NOT DRAWN TO SCALE
HAUL TRUCK
50 METER RADIUS
10m
① COMMUNICATE & WAIT FOR ACKNOWLEDGEMENT
② LINE OF SIGHT APPROACH AFTER COMMUNICATION
③ FINAL APPROACH, ONE UNIT PARKED WITH OPERATOR ON GROUND OR SAFE APPROACH PLAN IN PLACE.
Legend
NO ACCESS PERMITTED UNLESS ONE UNIT WITH OPERATOR ON GROUND OR SAFE APPROACH PLAN IN PLACE


SAFE APPROACH & PARKING
NOT DRAWN TO SCALE
GRADER
50 METER RADIUS
10m
10m
③ FINAL APPROACH ONE UNIT PARKED WITH OPERATOR ON GROUND OR SAFE APPROACH PLAN IN PLACE
② LINE OF SIGHT APPROACH AFTER COMMUNICATION
① COMMUNICATE & WAIT FOR ACKNOWLEDGEMENT
Legend
NO ACCESS PERMITTED UNLESS ONE UNIT WITH OPERATOR ON GROUND, OR SAFE APPROACH PLAN IN PLACE.

SAFE APPROACH & PARKING



Americas

Approval of Machinery and Mechanized Equipment S3AM-309-FM1

1.0 General Guidelines

1.1 Subcontractor equipment shall comply with all applicable legislative requirements, local, State, Federal, Provincial, Territorial for motor vehicles and material handling heavy equipment.

1.2 Approval shall be obtained for all subcontractor machinery and mechanized equipment within seven calendar days of use on the project site.

1.3 As applicable, all machinery and mechanized equipment must be certified and tested at appropriate intervals as required by the manufacturer and/or regulatory requirements.

1.4 Heavy equipment includes, but is not limited to, drill rigs, front-end loaders, backhoes, trackhoes, bulldozers, forklifts, and similar equipment used for the implementation of the project Statement of Work.

2.0 Equipment Safety Inspections

2.1 The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all-inclusive.

2.1.1 All machinery and mechanized equipment will be approved to be in safe operating condition (using the attached form) by a competent individual within seven calendar days in advance of operation on a new site or project. This approval is valid for one year for the given site or project.

2.1.2 Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.

2.1.3 Inspections shall include, but are not limited to, all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.

2.1.4 Drill rigs and related support equipment and vehicles shall be inspected by the driller in charge on a daily basis. These inspections shall be recorded on the Daily Drill Rig Checklist or on equivalent subcontractor forms.

2.1.5 Preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or the subcontractor's internal policies, schedules, and equipment Standard Operating Procedures.

2.1.6 Only designated qualified persons shall operate and inspect machinery and mechanized equipment.

2.1.7 The contractor shall maintain records of tests and inspections at the site and shall make the records available upon request of the designated authority; the records shall become part of the official project file.

2.1.8 Equipment found to not be in safe operating condition or to have a deficiency that affects the safe operation of the equipment shall immediately be tagged, taken out of service, and its use prohibited until deficiencies have been corrected to a safe condition.

2.1.9 All equipment shall be kept in the exclusion zone until decontaminated within designated decontamination areas.

2.1.10 Equipment with an obstructed rear view must have an audible alarm that sounds when equipment is moving in reverse.

TO: AECOM

DATE:

FROM:

Project Name: Project Number:

Project Location:

1. This form provides approval of machinery and mechanized equipment to be used on the referenced project for the following work:

Description of equipment work:	
Project site:	
Subcontractor providing equipment: Address:	
Dates (duration) of equipment work:	

2. Inspection and approval of machinery and mechanized equipment, as required by AECOM, has been made within seven calendar days in advance of use on the project site. This approval process shall be repeated for equipment that is used on the project or site for more than one year.

Identification of equipment (make, model, serial no.)		Date of Certification
1		
2		
3		

3. The above listed equipment has been inspected and tested as indicated on this form, and is DECLARED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Name		Title
Company		
Signature		Date

4. If there are any questions regarding this certification, please contact the following AECOM representative:

Americas

Heavy Equipment Pre-Operation Checklist

S3AM-309-FM2

Project Name/Location:													**Project #:**		
Equipment # / Name:			**Make/Model:**										**Annual Insp/Cert. Date:**		
Hour meter reading:															
Operator Name/Date															
✓ = Satisfactory; in working order **X** = Unsatisfactory; not in working order/damaged **N/A** = Not Applicable															
Check the following as appropriate	✓	X	N/A	✓	X	N/A	✓	X	N/A	✓	X	N/A	✓	X	N/A
Side Shields/Screens/Grab Handles															
Overhead Guard (ROPS, FOP)															
Horn / Backup Alarm															
Lights															
Gauges / Temperature															
Parking Brake / Service Brakes															
Steering / Controls															
Hydraulic System (full, no leaks)															
Other Fluids (radiator, washer, etc.)															
Blast Shields															
Attachment (bucket, forks, compactor, jib)															
Lift-arm Device															
Tires / Tracks / Treads (visual)															
Seat belt / Operator Seat Bar															
Windows / Mirrors / Wipers															
Exhaust Components															
Fuel System (lines secure/no leaks)															
Electrical Lines															
Fire Extinguisher															
Spark arrestor / Positive air shutoff															
Safety signs															
General condition (exterior clean/intact)															
General condition (interior clean/tidy)															
Quantity of Fuel Added															
Quantity of Oil Added															
Operator Signature															

Comments (including any corrections):

Americas

Rubber Tire Backhoe Operator Skill Evaluation

S3AM-309-FM3

Date _____ Employee Name _____ Evaluator _____

Description:

This equipment is used for primarily for excavation, although it may occasionally be used for other miscellaneous tasks for which crane or stick type equipment is required.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities b) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts, leaks; oil, hydraulic and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires if applicable g) Glass, wipers h) Gauges, including temperature, oil, and fuel i) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property c) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Excavating techniques a) Benching, sloping b) Spoil removal from side wall c) Back filling operations d) Aware of surroundings and personnel near the swing radius of boom	☐ Yes ☐ No
4) Can arrange controls and boom for travel	☐ Yes ☐ No
5) Speed in relation to terrain (controlled speed)	☐ Yes ☐ No
6) Stock piling with front end bucket	☐ Yes ☐ No
7) Loading truck bed with bucket	☐ Yes ☐ No
8) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Set all park brakes d) Lower bucket to ground e) Place and position wheel chocks f) Perform a general walk around looking for items for maintenance	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Scraper Operator Skill Evaluation

S3AM-309-FM4

Date _____ Employee Name _____ Evaluator _____

Description:

Drives a tractor to pull a steel bowl-like or box-like scoop (scraper), mounted on wheels, which scrapes up earth and transports it to a designated place; manipulates a series of levers to lower cutting edge of scraper into the ground, to raise cutting edge when scraper is full, to empty scraper

STEPS KEYPOINTS	SATISFACTORY
1. Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluids and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2. Identification of equipment controls	☐ Yes ☐ No
3. Loading techniques a) Use of apron b) Use of cutting edge c) Push loading d) Push/pull loading e) Use of ejector	☐ Yes ☐ No
4. Shifting and hauling	☐ Yes ☐ No
5. Rough cut and fill	☐ Yes ☐ No
6. Spreading material	☐ Yes ☐ No
7. Fine grading	☐ Yes ☐ No
8. Obtaining compaction	☐ Yes ☐ No
9. Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Lower apron d) Lower bowl to the ground e) Place and position wheel chocks f) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Bull Dozer Operator Skill Evaluation

S3AM-309-FM5

Date _____ Employee Name _____ Evaluator _____

Description:

Operates a large tractor with a concave steel blade or push block mounted in front of the chassis to level, distribute and push earth. This equipment may be used to push earth carrying equipment. A ripper attachment may be used for ripping the earth prior to loading the scraper. Operator regulates height of blade or push block from ground and may help in adjustments to equipment as needed

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tracks g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Audible horn v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Pushing techniques a) Use of push blade b) Loading of push load equipment	☐ Yes ☐ No
4) Use of ripper shanks	☐ Yes ☐ No
5) Rough cut and fill	☐ Yes ☐ No
6) Spreading material	☐ Yes ☐ No
7) Fine grading	☐ Yes ☐ No
8) Obtaining compaction by tracking in material	☐ Yes ☐ No
9) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Lower rippers d) Lower blade to the ground e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Dump Truck Operator Skill Evaluation

S3AM-309-FM6

Date _____ Employee Name _____ Evaluator _____

Description:

Drives a heavy-duty gasoline or diesel-powered truck used in hauling material to fill areas or dump sites. Truck is either tandem rear axle type, or tractor truck, single or tandem axle, pulling a trailer, articulated or fixed axle haul truck. May service and make necessary adjustments for proper operation of equipment.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational (1) Brakes (2) Lights (3) Back-up alarms (4) Hand rails & ladders (5) Seat belts (6) Tires (7) Glass, wipers (8) Gauges, including temperature, oil, air and fuel (9) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park or side line a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Truck Weighing a) Tare weights b) Gross Weights	☐ Yes ☐ No
4) Loading Techniques a) Parking into load patterns b) Bed preparation for material c) Remains in cab in loading area and while being loaded	☐ Yes ☐ No
5) Shifting and Hauling	☐ Yes ☐ No
6) Stockpiling	☐ Yes ☐ No
7) Backing with the use of mirrors	☐ Yes ☐ No
8) Dumping/Spreading Material a) Fill material b) Base course material c) Surface materials d) Asphalt e) Lowers truck bed (dump trucks) or dump chutes (belly dumps) f) Follows spotters directions (when applicable)	☐ Yes ☐ No
9) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Use park brake d) Place and position wheel chocks e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Roller / Compactor Operator Skill Evaluation

S3AM-309-FM7

Date _____ Employee Name _____ Evaluator _____

Description:

Operates a self-propelled gasoline or diesel machine, which has pneumatic tires, steel wheels/drums used to compact earth fills, flexible bases and all types of materials. Rollers are also used for compaction to achieve a desired or specified density. Rides on the machine platform and moves lever and pedals or throttles to control and guide machine.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires, if applicable g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Rolling techniques to obtain compaction a) Use of controls b) Vibratory controls c) Turns and maneuvers d) Aware of surroundings	☐ Yes ☐ No
4) Rolling patterns a) Staggered patterns with other rollers	☐ Yes ☐ No
5) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Place and position wheel chocks d) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Front End Loader Operator Skill Evaluation

S3AM-309-FM8

Date _____ Employee Name _____ Evaluator _____

Description:

Operates rubber tire or crawler type tractor with attached bucket on front end. Moves lever to raise, lower and dump contents of bucket. Machine used to load materials from stockpiles, excavation, loading trucks.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Loading techniques a) Use of bucket and controls b) Crowding the pile c) Pump loading, etc. d) Loading patterns e) Loading trucks f) Loading scrapers	☐ Yes ☐ No
4) Control handling of soils	☐ Yes ☐ No
5) Shifting and hauling	☐ Yes ☐ No
6) Stockpiling	☐ Yes ☐ No
7) Mixing and moisture conditioning	☐ Yes ☐ No
8) Feeding crusher	☐ Yes ☐ No
9) Rough cut and fill	☐ Yes ☐ No
10) Spreading material	☐ Yes ☐ No
11) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Lower bucket to the ground d) Place and position wheel chocks e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Grader Operator Skill Evaluation

S3AM-309-FM9

Date _____ Employee Name _____ Evaluator _____

Description:

Rides in cab of grader and moves levers and steering wheel to guide machine and regulate the scraper blade or ripper. Blade is mounted on a carrying and turning circle at the front of the machine. Equipment is used to level or mix soils and aggregates to grade and to lay asphalt and flexible base materials and clean haul roads.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires g) Glass, wipers h) Gauges, including temperature, oil, air and fuel v) Notify supervision of any equipment that is not operational vi) Wheel chocks vii) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Leveling and scraping techniques a) Use of levers b) Use of cutting edge c) Controlling front wheel tilt d) Controlling crab motion e) Use of ripper	☐ Yes ☐ No
4) Shifting and traveling with loaded moe board	☐ Yes ☐ No
5) Rough cut and fill	☐ Yes ☐ No
6) Spreading material	☐ Yes ☐ No
7) Fine grading	☐ Yes ☐ No
8) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Lower moldboard to the ground d) Place and position wheel chocks e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Excavator Operator Skill Evaluation

S3AM-309-FM10

Date _____ Employee Name _____ Evaluator _____

Description:

Operates a rubber tire or crawler type tractor with an attached bucket on front end. Moves a lever to raise and lower and dump contents of bucket. Machine is used to load materials from stockpiles, excavation, loading trucks.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Wheel chocks (for rubber tire type excavators) v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Loading techniques a) Use of bucket and controls b) Crowding the pile c) Pump loading, etc. d) Loading patterns e) Loading trucks f) Loading scrapers	☐ Yes ☐ No
4) Control handling of soils	☐ Yes ☐ No
5) Shifting and hauling	☐ Yes ☐ No
6) Stockpiling	☐ Yes ☐ No
7) Mixing and moisture conditioning	☐ Yes ☐ No
8) Feeding crusher	☐ Yes ☐ No
9) Rough cut and fill	☐ Yes ☐ No
10) Spreading material	☐ Yes ☐ No
11) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Lower bucket to the ground d) Place and position wheel chocks (rubber tire type excavator) e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Water Truck Operator Skill Evaluation

S3AM-309-FM11

Date _____ Employee Name _____ Evaluator _____

Description:

Drives articulated, pull type, single and two axle type water trucks. Waters roads, fills, and cut areas to suppress dust.

STEPS KEYPOINTS	SATISFACTORY
1) Demonstrated abilities a) Pre-shift inspection check list (*S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist* or equivalent or DOT daily inspection if applicable) i) Check equipment for loose bolts and leaks; check oil, air, hydraulic fluid and water ii) Make sure area around the equipment is clear of people and other equipment iii) Check for fire extinguisher iv) Make sure that the following equipment is operational a) Brakes b) Lights c) Back-up alarms d) Hand rails & ladders e) Seat belts f) Tires g) Glass, wipers h) Gauges, including temperature, oil, air and fuel i) Wheel chocks v) Notify supervision of any equipment that is not operational vi) The operator can park a piece of equipment that is unsafe to operate if it poses a danger or hazard to employees or property b) Maintain three points of contact while entering and exiting the equipment	☐ Yes ☐ No
2) Identification of equipment controls	☐ Yes ☐ No
3) Loading Techniques a) Minimizes spillage b) Uses chocks or turns into berm	☐ Yes ☐ No
4) Shifting and Hauling	☐ Yes ☐ No
5) Properly applies water to ramps/corners	☐ Yes ☐ No
6) Backing with the use of mirrors	☐ Yes ☐ No
11) Parking and shut down procedures a) Equipment line-up i) Straight line ii) Allow easy access for maintenance and servicing b) Turn off all accessories c) Use park break d) Place and position wheel chocks e) Perform a general walk around looking for maintenance items	☐ Yes ☐ No

Any items checked 'No' require additional training of operator and the skill evaluation to be repeated until the operator successfully achieves a satisfactory status in all skill identified.

Americas

Heavy Equipment Maintenance Inventory

S3AM-309-FM12

Equipment (*Make, Model, Serial #*)	Equipment Owner	Equipment Status (*On Hire, Active, Decommissioned*)	Frequency of service	Service Type	Manufacturer's Standards	Industry Standards	Legislated Requirements	Location of Equipment

Americas

Heavy Equipment Inspection Report

S3AM-309-FM13

TOOL	DATE	INSPECTED BY	RESULTS	ACTION REQUIRED	ACTION COMPLETED (DATE)

Americas

Manual Lifting

S3AM-014-PR1

1.0 Purpose and Scope

1.1 This procedure provides the requirements for AECOM employees to use when performing manual materials handling activities (e.g., lifting/handling of items or materials).

1.2 This procedure applies to all staff for AECOM Americas-based operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Manual Materials Handling (MMH)** – Moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

2.2 **Team Handling** – Team handling occurs when more than one person is involved during the lift.

3.0 References

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Administer the procedure, provide resources as required and provide direction on proper lifting/handling techniques.
- Ensure material handling activities are monitored and facilities assessed to ensure compliance with the procedure and proactively identify and correct hazardous conditions.
- Ensure the proper reporting and investigations of any incidents, including those associated with manual material handling.
- Ensure this procedure and any associated or applicable documents are reviewed as part of an investigation and revised as required to prevent future incidents.

4.1.2 **SH&E Manager**

- Ensure material handling activities are monitored and facilities assessed to ensure compliance with the procedure and proactively identify and correct hazardous conditions.
- Assist in identifying activities with a high potential for lifting/handling strains and injuries as well as the associated mitigation strategies.
- Ensure employee training on proper lifting/manual materials handling techniques.
- Assist in any investigations of incidents, including those associated with manual material handling.

4.1.3 **Employees**

- Complete training appropriate to their anticipated manual material handling tasks.
- Review and follow any additional procedures or instructions applicable to the task at hand.

4.2 Mechanical / Engineered Controls

4.2.1 Whenever possible, new operations should be evaluated to engineer out hazards before work processes are implemented.

4.2.2 Mechanical equipment or assistance such as hand carts, dollies, carts, come-alongs, conveyors, rollers, or if appropriate, pallet jacks, skid steers, or telehandlers, are preferable to be used whenever possible rather than the employee physically moving materials.

4.2.3 Mechanical assistance will be of proper size and height, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on joints.

4.2.4 Mechanical equipment or assistance shall be inspected and appropriately maintained. Defective equipment shall be tagged, removed from service, and repaired or replaced.

4.2.5 Objects to be moved will be secured to prevent falling and properly balanced to prevent tipping.

4.2.6 Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.

4.2.7 Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body—such as adjusting the height of a pallet or shelf.

4.2.8 Work methods and stations should be designed to minimize the distance between the person and the object being handled.

4.2.9 Confirm well-lit and clear paths of travel.

4.2.10 High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.

4.2.11 Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported seated posture. Bending the upper body and spine to reach into a bin or container is highly undesirable. The bins should be elevated, tilted, or equipped with collapsible sides to improve access.

4.2.12 Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors

4.3 Administrative Controls

4.3.1 Task hazard assessment (THA) must include manual material handling, its associated hazards and the appropriate actions to take to eliminate or reduce the identified risks.

4.3.2 Stage materials close to the applicable work area to minimize carrying distances.

4.3.3 When significant, sustained lifting work is required, it is desirable to rotate employees to spread the work load among several people and thereby avoid fatigue.

4.3.4 Rotation is not simply performing a different job, but is performing a job that utilizes a completely different muscle group from the ones that have been overexerted.

4.3.5 All employees exposed to manual handling hazards shall be trained by competent persons on the hazards associated with manual material handling, and the safe lifting and handling of loads applicable to their anticipated manual handling tasks.

4.3.6 Employees shall not manually handle materials in excess of their personal lifting limit, with no personal lifting limit exceeding 50 pounds (22.7kg).

- Manual handling weight limits may decrease from 50 pounds (22.7kg) depending upon several variables. Refer to *S3AM-014-ATT1 Recommended Weight Limit Calculations.*
- This restriction should also be applied to a team handling or a buddy lift (item lifted by the team should be no more than 50 pounds [22.7kg]). Should one lifter fail, the remaining worker would bear 100% of the load weight.

4.4 Training

4.4.1 Employees who may have MMH as part of their duties are required to receive training that includes the following topics:

- Methods to avoid unnecessary physical stress and strain during MMH operations.
- Signs and symptoms of musculoskeletal injuries and reporting requirements.
- Methods to maintain personal awareness of what the individual can comfortably handle without undue strain.
- Instruction on the proper use of lifting equipment.
- Recognition of potential hazards and how to prevent or correct them.

4.4.2 This training must be completed prior to an employee being assigned to a task that involves MMH activities.

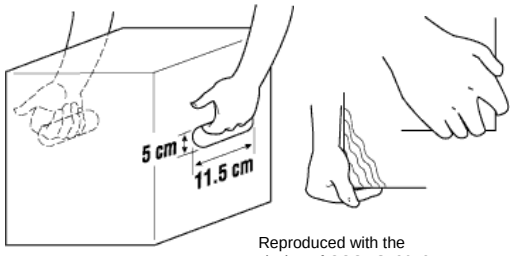
4.4.3 Assistance with training or training materials is available through the Safety, Health and Environment staff.

4.5 General Handling

4.5.1 Before Performing a Lift:

- Check to see if mechanical aids such as hoists, lift trucks/dollies, or wheelbarrows are available.
- Confirm that, based on personal physical capabilities and medical limitations, that the load can be lifted without overexertion. Get help with heavy or awkward loads.
- Confirm that the load is “free” to move.
- Do not lift loads if personal health issues or doctors recommendations prevent it.
- Manual handling weight limits may decrease depending upon several variables. Refer to *S3AM-014-ATT1 Recommended Weight Limit Calculations*.
- Do not manually handle loads if unsure of personal limitations on what load can be handled safely.
- Check that the planned destination and travel path of the load is free of obstacles, personnel and debris.
- Confirm that the travel path and the planned destination of the load are clear of obstacles and debris. Grease, oil, water, litter, and debris can cause slips and falls.
- Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, and sheet materials like metal or glass). See additional guidance in this procedure.

4.5.2 Gripping the Load



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- Whenever possible, utilize hand holds or other lifting attachments on objects being handled.
- Use the “hook grip” on loads with cut-out handholds.
- Curl fingers around the edge.
- Do not hold the load with fingertips. The palm grip is much more secure; grip the load with the palm of the hand and fingers.
- Use containers with handles located more than halfway up the side of the container.
- Use the “ledge grip” to handle regularly shaped objects without handles.

- Use vacuum lifters to handle sheet materials or plates.
- Hold the object with hands placed diagonally.

4.5.3 General Lifting Guidelines

- Prepare for the lift by warming up muscles. Frequently re-energize muscles throughout the course of the work.
- Avoid lifting immediately after prolonged sitting or inactivity.
- Confirm personal protective equipment is appropriate to the hazards (e.g. safety toed boots, appropriate gloves, etc.).
- Stand close to the load and face the intended direction of travel.
- Ensure good body balance. Feet should be shoulder width apart, with one foot beside and the other foot behind the object that is to be lifted.
- Bend the knees; do not stoop. Keep the back straight, but not vertical. There is a difference. The neck should be in a natural position with eyes forward.
- Engage (tighten/flex) abdominal muscles. Use legs to start the load moving and continue pushing up with the legs. This makes full use of the strongest set of muscles.
- Keep the arms and elbows close to the body while lifting smoothly without jerking.
- To lower the object, bend the knees. Do not stoop. To deposit the load on a bench or shelf, place it on the edge and push it into position. Confirm that your hands and feet are clear when placing the load.

4.5.4 Carrying/Holding Guidelines

- Manual carrying is an inefficient way of transporting materials in the work place. Where possible, reduce or eliminate manual carrying tasks.
- Never carry a load above the shoulders.
- Do not twist the body while carrying the load. To change direction, shift foot position and turn the entire body.
- Watch direction of travel!
- Carry an object close to the body using both hands. The optimal carry zone should have the elbows at a 90 degree angle with elbows tight to the body. One-handed carries are awkward and tend to unbalance the body.
- Do not carry objects that are so large they will obstruct visibility.
- Do not change grips on an object while carrying or holding an object. Rest the object on a secure surface prior to changing grip.
- If an object is of a size, shape, or mass that it requires two people to carry, use two people of similar size and physique.
    - Ensure the item lifted and carried by the team weighs no more than 50 pounds (22.7kg). Remember manual handling weight limits may decrease from 50 pounds (22.7kg) depending upon several variables. Refer to *S3AM--014-ATT1 Recommended Weight Limit Calculations.*
    - Two-person lifts should be planned and coordinated before performing the lift.
    - Lift the item in unison.
- Avoid carrying objects on stairs, particularly where the line of sight may be obstructed or the object can interfere with leg movement. All travel on stairs requires use of a handrail at all

times, so only carry objects that can be safely handled with one hand. Always maintain handrail contact when carrying an object up or down stairs.

4.6 Specific Handling - Pushing/Pulling Guidelines

4.6.1 Check the condition of the floor, ground, or other surface prior to pushing or pulling an object across it.

4.6.2 Be aware of the “break out” force of the object; this is the force at which a push or pull overcomes the frictional force between the surface and object. Adjust lower body posture to have a solid base in order to avoid losing balance when this point is reached.

4.6.3 Get assistance when moving or guiding a large load.

4.6.4 Where possible, always push rather than pull a load.

4.6.5 When possible push at waist height not shoulder height. The force capability at shoulder height is 50% less than at waist level.

4.6.6 Casters or wheels on carts should be at least 6 inches (15.24 centimeters) diameter for heavier loads in order to exercise adequate control on rough or inclined surfaces. Tire materials should be suitable for the surface of travel.

4.6.7 Never load the cart or load-carrying device in such a manner that visibility is obstructed in the path of travel.

4.6.8 When pushing or pulling an object on an inclined surface, ensure control of the load and direction of travel before proceeding. Obtain additional support to control the load if necessary.

4.6.9 Never leave carts or loads in an area that will present a hazard to other workers. Make sure carts or transport devices are secured in position before leaving them unattended.

4.7 Specific Handling – Square or Rectangular Objects



4.7.1 Place one foot slightly in front of the other.

4.7.2 Squat as close to the object as possible.

4.7.3 Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.

4.7.4 Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight.

4.7.5 Test to confirm that the object is loose from floor and will lift without snagging.

4.7.6 Straighten the legs, keeping the spine straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.

4.7.7 If turning or change of direction is required, turn with feet without twisting the torso and step in the direction of travel.

4.7.8 To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

4.8 Specific Handling – Cylindrical Objects

4.8.1 When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible.

- Check the integrity of drums of gas cylinders before handling. Confirm lids or caps are secured prior to moving.
- Rolling must be controlled by chute, tagline, or other means of limiting acceleration.

- Workers must not be positioned downhill from rolled objects.
- Use of the legs for pushing and tagline control of rolled objects must be stressed.

4.8.2 Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus maintaining balance and a steady, controlled, forward motion. Motion must be controlled so that ceasing to walk and moving the hands will stop forward motion.

4.8.3 Use carts or trucks to transport cylinders. Never attach a lifting or moving device to the cap or lid.

4.8.4 Use two people to transport a cylinder if carts cannot be used. Use lifting straps to improve grip.

4.9 Specific Handling – Bags and Sacks

4.9.1 The best way to handle a bag depends on its size, weight, and how far it is to be carried. When lifting, remember to:

- Straddle the end of the bag.
- Bend the hips and knees.
- Keep the back straight.
- Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.



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- Lean forward, straightening the knees to set the bag upright.
- Readjust the straddle position moving feet closer to the bag.
- Readjust the grasp, with one hand clasping the bag against the body and the other hand under the bag.
- Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
- Thrust the bag up with the knee while straightening the body. If possible place the bag on an intermediate platform to enable the grip / grasp to be readjusted.
- Put the bag on the shoulder opposite the knee used to thrust the bag up.
- Stabilize the bag on the shoulder.
- Move off without bending sideways.

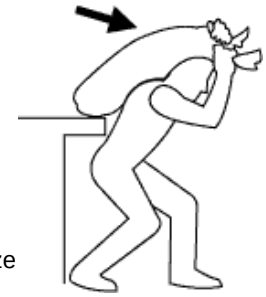
4.9.2 Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a co-worker, remember to:

- Stand close to the platform.
- Place one foot in front of the platform.
- Bend hips and knees.
- Keep the back straight.
- Ease the bag off the shoulder and put it upright on the platform.
- Pull the bag slightly over the edge of the platform.
- Stand close to the platform with the bag touching the chest.
- Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
- Step back.
- Bend hips and knees, keeping back straight.

- Ease the bag onto the floor.

4.9.3 Bulkier sacks are easier to carry on a worker's back. The worker is to lift the sack to his/her back from a platform:

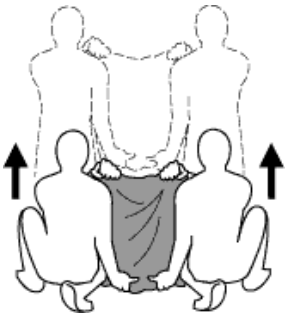
- Move the sack to the edge of the platform.
- Put back against the sack.
- Grasp with both hands on the upper corners of the sack.
- Ease the sack onto the back, bending hips and knees before taking the weight.
- Keeping the back straight, stand up, straighten hips and knees and stabilize the sack.
- Move away without bending sideways.



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4.9.4 Two-person handling of a sack:

- Position one person on either side of the sack.
- Squat with one foot balancing behind the sack.
- Keeping the back straight, grasp with the outer hand on the upper corner of the sack and the other hand holding the bottom of the sack.
- On one person's command:
  - Stand up and straighten the hips and knees.
  - Move toward the intended location.
  - Put the sack in its intended location.



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4.10 Specific Handling – Sheet Materials

4.10.1 When lifting sheet materials:

- Stand close to the pile of sheets in a walking stance.
- Grasp sheet firmly at the midpoint of its long side with the closer hand.
- Pull sheet up and toward the body.
- Change grip using the other hand and put fingers on top of the sheet.
- Pull sheet up to the vertical position and to the side until one half is off the pile.
- Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
- Stand up without bending or twisting body.

4.10.2 Whenever moving sheet materials, be cognizant of wind conditions.

4.10.3 To carry sheets (drywall, glass, metal, etc.):

- Use drywall carts or sheet hand trucks to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.

4.10.4 Use team lifting and carrying where other solutions are inappropriate.

- Remember that the combined strength of the team is less than the sum of individual strength. The item lifted by the team should be no more than 50 pounds (22.7kg).

- Select team members of similar height and strength and assign a leader to the team.
- Determine a set of commands to be used such as "lift," "walk," "stop," and "down." Make sure that everyone knows what to do when they hear the command.
- Follow the commands given by the team leader.
- Practice team lifting and carrying together before attempting the task.

4.11 Material Storage

4.11.1 Store materials at a convenient height.

4.11.2 Leave the lowest shelf unused if necessary.

4.11.3 Use vertically mobile shelves or elevating platforms to avoid bending and overhead reaching.

4.11.4 Use bin racks for storing small items.

4.11.5 Store heavy and frequently used materials between knee and shoulder height; preferably waist height.

4.11.6 Do not store materials at floor level.

4.11.7 Use hand trucks with elevating devices in storage and loading areas.

4.11.8 Use trucks with a tilting device to avoid bending.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-014-ATT1 Recommended Weight Limit (RWL) Calculations

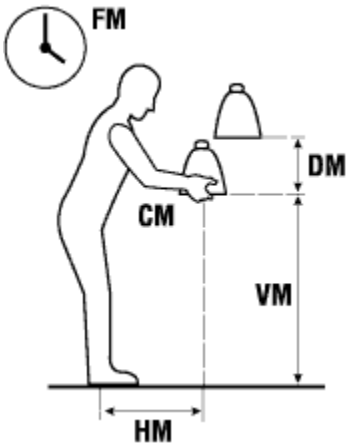
Americas

Recommended Weight Limit (RWL) Calculations

S3AM-014-ATT1

This lifting equation, developed by the National Institute for Occupational Safety and Health (NIOSH), takes into account the weight of an object plus several other variables in lifting tasks that contribute to the risk of injury. For example, if the situation requires frequent lifts or lifting loads far away from the body, there is an increased risk of injury. Under these conditions, the weight limit would be reduced from a baseline weight or "load constant" (LC) to a recommended weight limit (RWL). A "load constant" (LC) of 23 kg (about 51 pounds) has been established by NIOSH as a load that, under ideal conditions, is safe for 75% of females and 90% of males. More information on the NIOSH Lifting Equation can be found on the Centers for Disease Control and Prevention website.

To calculate the RWL, you must first measure or assess several variables related to the lifting task. The six variables that are considered in determining the RWL are:

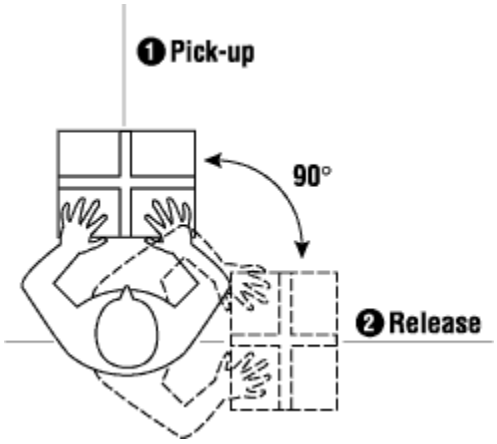


- The horizontal distance (H) the load is lifted (distance of hands from midpoint between ankles),
- The starting height of the hands from the ground (V),
- The vertical distance of lifting (D),
- The time between lifts or frequency of lifting (F),
- The angle of the load in relation to the body (e.g., straight in front of you or off to the side, A), and
- The quality of the grasp or handhold based on the type of handles available (hand-to-load coupling, C).

Each of these variables is then assigned a numerical value (multiplier factor) from look-up charts. The equation includes six multiplier factors to calculate the RWL:

RWL = LC x HM x VM x DM x FM x AM x CM

Where LC is the load constant (23 kg) and other factors in the equation are:



- HM, the "Horizontal Multiplier" factor,
- VM, the "Vertical Multiplier" factor,
- DM, the "Distance Multiplier" factor,
- FM, the "Frequency Multiplier" factor,
- AM, the "Asymmetric Multiplier" factor, and
- CM, the "Coupling Multiplier" factor.

Horizontal Multiplier is the distance the object is from the body. Measure (in centimeters) the distance from in between the person's ankles to their hands when holding the object. Write down this number. Next, look up the number on the accompanying chart and find the matching "multiplier factor". Use this factor in the lifting equation.

Vertical Multiplier is measured as the starting point of the lift and is the distance in centimeters of the hands up from the ground. Measure this distance and use the number to determine which value to use on the chart.

Distance Multiplier is the number of centimeters the load travels up (or down) from the starting position. Measure this distance and use the number to determine which value to use on the chart.

Frequency Multiplier is how often the lift is repeated within a certain time period. You need to determine if the lift is done while standing or stooping, for more or less than one hour (in total time for the shift), and how much time there is for rest between lifts.

Asymmetric Multiplier measures if the body must twist or turn during the lift. This measurement is done in degrees (with 360° being one complete circle).

Coupling Multiplier determines the "coupling" or type of grasp the person has on the container. It rates the type of handles as good (handles), fair (make-shift cut outs in cardboard boxes) or poor. You also need to know if the lift is done in a standing or stooping position.

When these multipliers are placed into the equation, determine the RWL. If the weight of the object to be lifted exceeds the RWL, the task is considered to be dangerous. Assess the relevant factors which contribute most to the risk (the lower the factor, the more it contributes to the risk) and redesign the handling task.

The lifting equation only applies in certain situations. It does not apply in situations where a person is lifting (or lowering):

- With one hand,
- For over 8 hours,
- While seated or kneeling,
- In a restricted work space,
- Objects that are unstable (such as buckets or containers of liquids),
- While pushing or pulling,
- With wheelbarrows or shovels,
- With high speed motion (faster than about 30 inches/second or 76 centimeters/second),
- Extremely hot or cold objects or in extreme temperatures, or
- With poor foot/floor coupling (high risk of a slip or fall).

This equation applies to most workers for:

- Two-handed lifting,
- Comfortable lifting postures, and
- Comfortable environments and non-slip floorings.

FACTORS USED IN RWL CALCULATIONS

Horizontal Multiplier (HM): Horizontal distance (H, in cm) from the midpoint between the ankles to the hands while holding the object.

H = Horizontal Distance (cm)	HM Factor
25 or less	1.00
30	0.83
40	0.63
50	0.50
60	0.42

Vertical Multiplier (VM): The vertical distance (V, in cm) of the hands from the ground at the start of the lift.

V = Starting Height (cm)	VM Factor
0	0.78
30	0.87
50	0.93
70	0.99
100	0.93
150	0.78
175	0.70
>175	0.00

Distance Multiplier (DM): The vertical distance (D, in cm) that the load travels.

D = Lifting Distance (cm)	DM Factor
25 or less	1.00
40	0.97
55	0.90
100	0.87
145	0.85
175	0.85
>175	0.00

Asymmetric Multiplier (AM): The twisting angle (A) of the body while lifting, measured in degrees.

A = Angle (degrees)	AM Factor
90°	0.71
60°	0.81
45°	0.86
30°	0.90
0°	1.00

Frequency Multiplier (FM): The frequency (F) of lifts and the duration of lifting (in minutes or seconds) over a work shift.

F = Time Between Lifts	FM Factor			
	Lifting While Standing		Lifting While Stooping	
	One Hour or Less	Over One Hour	One Hour or Less	Over One Hour
5 min	1.00	0.85	1.00	0.85
1 min	0.94	0.75	0.94	0.75
30 sec	0.91	0.65	0.91	0.65
15 sec	0.84	0.45	0.84	0.45
10 sec	0.75	0.27	0.75	0.27
6 sec	0.45	0.13	0.45	-
5 sec	0.37	-	0.37	-

Coupling Multiplier (CM): The quality of grasp (or coupling, C) classified as good, fair or poor and depends on the body position (either standing or stooping).

C = Grasp	CM Factor	
	Standing	Stooping
Good (handles)	1.00	1.00
Fair	1.00	0.95
Poor	0.90	0.90

Americas

Material Storage

S3AM-316-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas-based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, where materials are stored and used. Note that this standard does not address manual material handling (e.g., manual lifting, lowering, pushing, pulling, carrying, holding, or restraining). Information on manual material handling can be found in *S3AM-014-PR1 Manual Lifting*.

1.2 The purpose of this standard is to ensure the safety of AECOM personnel during the storage of materials.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-014-PR1 Manual Lifting

3.2 S3AM-115-PR1 Hazardous Materials Communication

4.0 Procedure

4.1 Implementation of this standard is the responsibility of the Manager directing activities of the facility, site, or project location.

4.2 Employees shall be properly trained and follow the established procedures applicable to the material stored.

4.3 General

4.3.1 Consult additional applicable jurisdictional requirements and AECOM procedures for specific tasks, materials, and equipment involved in material storage operations.

4.3.2 Storage areas should be specifically designated and be clearly marked. Aisles should be clearly marked, be of ample width for the type of storage, and be kept free from obstacles and trash.

4.3.3 Store materials in a manner that prevents damage or deterioration to the material and in a configuration that is safe and provides for the optimal and efficient use of storage space.

4.3.4 Material must not be stacked within 18 inches of the sprinkler heads Material should be kept well clear of light fittings, heating pipes and ceilings.

4.3.5 Ensure that stacks are stable and self-supporting.

- Stack symmetrically.
- Base areas and heights of stacks should be kept as small as circumstances permit. The ratio of height to base dimensions of large stacks should be correctly proportioned so that failure of part or whole of the stack does not occur.
- Experience has shown that the height to base ratio of an unsupported stack should not exceed 3 to 1.
- As most stacks are erected by visual alignment, a slight error in calculation near the base can easily result in a barely noticeable overhang, with a resultant loss of stability.

- Where effective banding and shrink wrapping can be achieved, the ratio of height to base can be safely increased to 4 to 1.
- Stable construction of the stack is entirely dependent upon the following factors:
  - Safe relation of height to dimension of base;
  - Sound interlocking of the material;
  - Contents of the cartons;
  - Shape of articles

4.3.6 Post maximum safe loads for all floors above grade in pounds per square foot.

4.3.7 As applicable, stack, rack, block, interlock, band or shrink-wrap, or otherwise secure all materials to be stored in tiers to prevent sliding, falling, or collapse.

4.3.8 De-stacking is largely the reverse process of stacking. Most accidents involving the collapse of stacked materials occur during de-stacking. The prime cause of this is haphazard removal. All stacking and de-stacking should be carried out under competent supervision. Basic rules for breaking down stacks are:

- One person should be responsible for the manner in which the stack is reduced;
- The stack should be taken down tier by tier and;
- As there is a high tripping hazard in the working area of a stack, tidiness and systematic work methods are essential.

4.3.9 Keep aisles, passageways, and other access ways clear to provide for the free and safe movement of material-handling equipment or employees. Mark all permanent aisles.

4.3.10 Segregate and label non-compatible materials. Refer to *S3AM-117-PR1 Hazardous Materials Communication*.

4.3.11 When loads swing freely, confirm non-compatible materials are segregated. Do not lift loads or swing over the heads of persons; it is not permitted to walk under a load. Wear hardhats in these areas.

4.3.12 Do not place material stored inside buildings under construction within 6 feet (1.8 meters) of any hoistway or inside floor openings, or within 10 feet (3 meters) of any exterior wall lower than the top of the material stored.

4.3.13 Pallets should be of sound construction, and be of adequate strength for the loads and conditions under which they are used. Where pallet loads are stacked tier on tier, the unit loads must be able to support the weight above.

4.3.14 Stacks, shelving and other fixtures for holding or storing materials should be so laid out and designed that there is sufficient access for safe loading and unloading by either manual or mechanical means

4.4 Stacking Frames

4.4.1 Conduct a visual inspection of the stacking frames prior to loading for damage (e.g., bent, twisted, broken or excessive rust). Remove from service any stacking frames that fall into any of these categories.

4.4.2 Several pallets can be loaded on a stacking frame provided they are stable and will not fall.

4.4.3 If more than one (1) pallet is placed on a stacking frame and materials are unstable or appear to be capable of falling, the pallets will be shrink-wrapped or banded together or stored in another storage location.

4.4.4 Do not exceed the maximum load of the stacking frame. Be sure to include the weight of the stacking frame in the maximum load calculation.

4.4.5 Material on a stacking frame will not extend above the top rail if another stacking frame is to be placed on top of the lower frame.

- The highest or top stacking frame may have material that extends above the top rails, but the pallet itself must be below the top rails and the material secured.

4.4.6 Stacking frames will only be stacked high enough for forklift forks to be able to reach and remove one (1) frame at a time. At no time will they be stacked higher than five (5) high regardless of the dimensions of the stacking frame. Material placed on the top rack will be banded or shrink wrapped (if applicable).

4.4.7 Do not mix stacking frames manufactured by different companies (e.g., a UNICOR with a Nestainer or other manufacturer).

- Stacking frames of different colors can be intermingled but will be of the same dimensions and manufacturer (e.g., UNICOR to UNICOR, Nestainer to Nestainer).

4.4.8 The 1st (lowest) stacking frame will have the greatest amount of weight. The subsequent frames will, if possible, have less weight than the frame immediately below it. This is to avoid top heaviness.

4.4.9 When picking up a stacking frame, ensure the MHE forks are securely seated into the two (2) stirrups of the frame. When traveling, maintain a clear field of vision and travel in reverse if vision is obstructed by the load. Sound your horn at all intersections and blind spots.

4.4.10 Transport one (1) loaded stacking frame at a time.

4.4.11 When traveling with a pallet, keep load as low as possible. Do not bulldoze pallets or stacking frames.

4.5 Bagged Materials

4.5.1 Provide bags of cement and lime stacked over ten bags high with restraining walls of appropriate strength.

4.5.2 Stack cement, lime, and similar materials in bags so that the mouths of the outside bags are facing the center of the stack.

4.5.3 During un-stacking, keep the entire top of the stack nearly level, and maintain the necessary setback.

4.5.4 Warn employees handling cement or lime about skin burns, and ensure that goggles, gloves, and clothing that fits snugly about the neck and wrists are worn.

4.5.5 Lime must be stored to prevent a premature slaking action that may cause fire.

4.6 Bricks and Blocks

4.6.1 Brick stacks must not exceed 7 feet (2.1 meters), and they should be tapered back starting at 4 feet (1.2 meters).

4.6.2 Always stack bricks on planks, asphalt, or concrete, and never on uneven or soft surfaces.

4.6.3 Keep the top of brick stacks level and maintain the taper during un-stacking operations.

4.6.4 Stack blocks in tiers on solid, level surfaces, and taper back over the 6-foot (1.8-meter) level.

4.7 Lumber

4.7.1 When stacking lumber, place cross strips on stacks more than 4 feet (1.2 meters) high.

4.7.2 Remove all nails from used lumber before stacking, unless the lumber is to be burned or hauled away without further handling.

4.7.3 Stack lumber on level and solidly supported sills to be stable and self-supporting.

4.7.4 Do not stack lumber more than 16 feet (4.9 meters) high.

4.8 Reinforcing and Structural Steel

4.8.1 Store steel rods in separate stacks according to length and size.

4.8.2 Carefully stack structural steel to prevent the danger of members sliding off, or the stack toppling over.

4.8.3 Never store “I” beams with the webs vertical.

4.9 Foundation Bolts

4.9.1 Stack bolts in separate stacks according to length and size.

4.10 Corrugated and Flat Iron

4.10.1 Stack corrugated and flat iron flat, and not more than 4 feet (1.2 meters) high.

4.10.2 Place spacing strips between bundles.

4.11 Pipes, Poles, and other Cylindrical Material

4.11.1 Stack and block cylindrical material in such a way to keep the material from spreading or toppling.

4.11.2 Do not stack pipes higher than 5 feet (1.5 meters) unless racked.

4.11.3 When removing pipe or other material larger than 2 inches (5 centimeters) in diameter from storage, and where stacked pipe runs in one direction and is more than one pipe high, employees will be instructed to approach the stack from the ends, not from the sides.

4.12 Sand, Gravel, and Crushed Stone

4.12.1 While removing sand, gravel, and crushed stone from stockpiles, ensure there are no overhanging or vertical faces at any time.

4.12.2 Do not store material dumped against walls or partitions to a height that will endanger the stability or exceed the resisting strength of such walls and partitions.

5.0 Records

5.1 No documentation maintenance is required.

6.0 Attachments

6.1 None

Americas

Non-Ionizing Radiation

S3AM-121-PR1

1.0 Purpose and Scope

1.1 Provides the requirements and guidelines to control occupational and public exposure to non-ionizing radiation, including lasers and radiofrequency (RF), infrared (IR), and ultraviolet (UV) radiation.

1.2 This procedure applies to all AECOM Americas employees and operations, and any other entity and its personnel contractually required to comply with this document's content, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

2.1 **Controlled Environment** – An area where the occupancy and activity of those within is subject to control and supervision for the purpose of protection from radiation hazards.

2.2 **Hazard Distance** – Distance from a radiofrequency emitter at which the power density equals the Uncontrolled Environment Maximum Permissible Exposure Limit power density level as established by the latest edition of the ANSI C95.1.

2.3 **ANSI Z136.1 Safe Use of Lasers**– American National standard issued applicable to the safe use of lasers and laser systems emitting laser radiation in the wavelength range 180 nanometres to 1 millimetre. The standard defines the classification of lasers (Class 1, 1M, 2, 2M, 3R, 3B and 4) based on Accessible Emission Limit (AEL) and viewing conditions.

2.4 **Infrared (IR)** – Electromagnetic radiation having a wavelength just greater than that of the red end of the visible light spectrum but less than that of microwaves. Infrared radiation has a wavelength from about 800 nm to 1 mm, and is emitted particularly by heated objects

2.5 **Laser –** An acronym for Light Amplification by Stimulated Emission of Radiation.

2.6 **Maximum Permissible Exposure (MPE) Limits** – The level of exposure which is considered as the limit between safe and potentially harmful.

2.7 **Non-ionizing Radiation** – Any type of electromagnetic radiation that does not carry enough energy to ionize atoms or molecules. Examples include radiofrequency radiation, microwave radiation, ultraviolet radiation, visible light, infrared radiation, lasers, static electric and magnetic fields, etc.

2.8 **Radio frequency (RF)** – Any of the electromagnetic wave frequencies that lie in the range extending from around 3 kHz to 300 GHz, and includes frequencies used for communication signals (e.g. radio, cell-phone, etc.) or radar signals.

2.9 **Ultraviolet (UV)** – Electromagnetic radiation having wavelengths between that of ordinary, visible violet light that of x-rays. Ultraviolet radiation is made up of three types of rays; A (UVA), B (UVB), and C (UVC). UV radiation is present in sunlight, and also produced by electric arcs and specialized lights (e.g. mercury-vapor lamps, black lights).

2.10 **Uncontrolled Environment** – Locations where there is the exposure of individuals who have no knowledge or control of their exposure.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-120-PR1 Radiation

3.3 S3AM-128-PR1 Medical Screening & Surveillance

3.4 S3AM-208-PR1 Personal Protective Equipment

3.5 S3AM-209-PR1 Risk Assessment & Management

3.6 S3AM-325-PR1 Lockout Tagout

3.7 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Corporate SH&E Management System & Prequalification Manager**

The SH&E Department will maintain this procedure and include it in the annual review of the AECOM Americas SH&E procedures.

4.1.2 **SH&E Manager (or designee)**

The SH&E Manager will provide technical guidance to projects that involve the use/survey of non-ionizing sources as well as identifying the proper controls to mitigate employee exposure to non-ionizing radiation sources, including UV radiation. In addition, SH&E Managers will:

- Review and approve all exposure plans, such as Non-Ionizing Radiation Protection Plans (NIRPP);
- Conduct non-ionizing radiation hazard assessments;
- Confirm applicable awareness training on non-ionizing radiation hazards is available to project teams. Refer to *S3AM-003-PR1 SH&E Training*;
- Authorize the use of a Class 3B and 4 lasers.

4.1.3 **Manager**

Managers are responsible for the overall safety and planning for a project. Managers are also responsible for:

- Verifying that the presence of non-ionizing radiation sources at project work sites are identified in the applicable SH&E Plan and Task Hazard Assessment (THA) prior to commencing field activities;
- Addressing and controlling potential non-ionizing radiation hazards through consultation with the SH&E Manager, subject matter experts (as appropriate), and/or development of a NIRPP;
- Verifying incident and injury reporting procedures are followed when a suspected overexposure to non-ionizing radiation, an incident of sunburn, or other excessive non-ionizing radiation exposure occurs in the workplace;
- Monitoring employee compliance with the requirements of this policy;
- Confirming employees complete non-ionizing radiation awareness training as directed by the SH&E Manager.

4.1.4 **Employee**

- Will not disturb or handle any non-ionizing radiation sources or work in any identified non-ionizing radiation hazard area (e.g.., Controlled Environment) without appropriate training and safety procedures;
- Will work in accordance with all established manufacturer, client, and NIRPP requirements;
- Will identify both known and suspected non-ionizing radiation sources on the THA and report any change in site conditions related to non-ionizing radiation sources to the Manager;
- Will immediately notify the Manager of the presence or suspected presence of previously unidentified non-ionizing radiation sources in the workplace, and cease all work activities involving potential exposure to non-ionizing radiation until further direction is received;
- Will use suitable personal protective equipment to the non-ionizing radiation hazards.

4.2 Hazard Assessment

4.2.1 AECOM will identify and assess the hazards associated with work where the potential exists for employees to be exposed to laser radiation or other non-ionizing radiation sources, develop appropriate elimination and control measures, and document this in the location or project specific SH&E Plan.

- If routine exposures to laser radiation or other non-ionizing radiation sources are expected, an appropriate plan, such as a Non-Ionizing Radiation Protection Plan (NIRPP) should be developed. The plan (e.g. NIRPP) may be included in the location or project specific SH&E Plan;
- Consultation with subject matter experts may be necessary depending upon the extent, number, and type of non-ionizing radiation (e.g., Laser Safety Officer);
- Task specific hazards and associated controls shall also be identified in the respective THA;
- Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.2 In addition to the SH&E Plan, appropriate personal protective equipment will be identified and documented in the THA or other relevant hazard assessment documentation.

4.2.3 AECOM will develop and implement an appropriate NIRPP to control identified hazards where the potential to exceed the applicable Maximum Permissible Exposure (MPE) limits exist.

4.3 Laser Protection Requirements

4.3.1 Only qualified and trained employees will be assigned to install, adjust, and operate laser equipment for surveys, alignment/grade-checks, tunnel work, etc.

4.3.2 Laser equipment will bear a label to indicate maximum power output, ANSI class, and beam spread.

4.3.3 Looking into the primary beam is prohibited, and care will be taken to avoid looking at specular reflections of the beam, including those from lens surface work.

4.3.4 Where direct or reflected laser light greater than 0.005 watts (5 milliwatts) for ≥ ¼ second exists, employees will be provided with laser safety goggles that will protect them for the specific wavelength of the laser and be of an optical density (OD) adequate for the energy involved. The laser safety goggles will be selected in accordance with the requirements of ANSI Z136.1-2014 (or the most current edition).

4.3.5 Operation of an ANSI Class 3B or 4 laser should be assessed for exposure hazards and whether medical surveillance is appropriate. Refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3.6 Use of an ANSI Class 4 laser requires the approval of the SH&E Manager.

4.3.7 All protective goggles will bear a label identifying the following data:

- The laser wavelength for which use is intended;
- The optical density of that wavelength;
- The visible light transmission.

4.3.8 Class 1 Lasers

- Safe for the unprotected eye and through optical instruments (prescription lenses, telescopes, beam reducers, etc.);
- Very low power lasers or enclosed lasers;
- MPE is never exceeded, even for very long exposure (hours), or with the use of optical instruments;
- Nominal Hazard Zone: none.

4.3.9 Class 1M Lasers

- Safe for the unprotected eye only, but potentially hazardous when optical instruments are used;
- Medium power lasers either collimated with a large beam or highly divergent;
- MPE can be exceeded when using optical instruments;
- Nominal Hazard Zone: none for the unprotected eye.

4.3.10 Class 2 Lasers

- Safe for unintended exposure, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds;
- Visible (wavelength of 400–700 nanometers) low power lasers;
- MPE is not exceeded provided the viewings are accidental only. MPE calculation assumes the blink reflex will stop the light after 0.25 second;
- Nominal Hazard Zone: none for accidental exposure.

4.3.11 Class 2M Lasers

- Safe for the unprotected eye when the exposure is unintended, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds or when optical instruments are used;
- Visible (wavelength of 400–700 nanometers) medium power lasers either collimated with a large beam or highly divergent;
- MPE is not exceeded provided the viewings are accidental only and only with unprotected eyes. MPE calculation assumes the blink reflex will stop the light after 0.25 seconds. Using optical instruments might bring the exposure above the MPE as well;
- Nominal Hazard Zone: none for accidental exposure to the unprotected eye.

4.3.12 Class 2M Lasers and Greater

- Areas where a Class 2M or higher, non-enclosed path laser beam is in use will be posted with standard laser-warning placards;
- Beam shutters or caps will be used, or the laser turned off, when laser transmission is not actually required. When the laser is left unattended for a period of time (e.g., >5 minutes), such as during the lunch hour, overnight, or at change of shifts, the laser will be turned off;
- Only mechanical or electronic means will be used as a detector for guiding the internal alignment of the laser. Aligning the laser with the unprotected eye is prohibited;
- The laser beam will not be directed at employees. Laser units will be set above or below the heads of employees;
- Employee exposure will be controlled to stay within the MPE limits specified in ANSI Z136.1-2014 (or the most current edition).

4.3.13 Class 3R Lasers

- Unsafe, except when handled carefully by experienced users. Accidental short exposure is considered as a small hazard;
- Low power lasers;
- MPE can be exceeded up to 5 times;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.14 Class 3B Lasers

- Unsafe without exception, laser safety goggles shall be worn within the nominal hazard zone. Focused lasers of this class are a potential fire hazard;

- Medium power lasers;
- MPE is exceeded more than 5 times. Skin MPE is not generally exceeded, except at focus;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.15 Class 4 Lasers

- Dangerous, Personal Protective Equipment (PPE) for eyes and skin shall be worn within the nominal hazard zone. Class 4 lasers are fire hazards as well. Diffuse reflections may be hazardous;
- High power lasers;
- Ocular and skin MPE are exceeded. Diffuse reflections exceed the MPE;
- Nominal Hazard Zone: hazard area for the eye and for the skin.

4.4 Radiofrequency Radiation Protection

4.4.1 Reduction in radiofrequency (RF) exposures can be accomplished through the implementation of appropriate administrative, work practice and engineering controls. Should routine occupational RF exposures be part of a project, a suitable plan shall be developed such as an NIRPP.

4.4.2 Generally, where RF emitters are identified, employees will:

- Remain outside any demarcated area where an RF hazard exists;
- Remain within the General Public exposure region;
- If the preceding requirements cannot be met or determined, AECOM will obtain a hazard assessment from the emitter's operator for controlling entity and provide it to the SH&E Manager for evaluation and determination of the relevant hazard mitigation measures.

4.4.3 If the above information is not available, an RF emitter survey will be required to assess the potential exposure hazards. An RF emitter survey shall be performed by an individual trained to effectively assess RF exposures.

4.4.4 Unless using an RF meter under the direction of an individual trained to effectively assess RF exposures, employees will not enter any area which is located within the RF hazard distance identified by the RF emitter survey. AECOM personal may enter a controlled area if the emitter has been de-energized and locked-out using standard Lockout/Tagout procedures in accordance with *S3AM-325-PR1 Lockout Tagout.*

4.5 Infrared Radiation Protection

4.5.1 Infrared (IR) radiation may be encountered during furnace operations, pouring, casting, hot dipping, laser and high-intensity light sources, curing, annealing and plastic welding.

4.5.2 Performance of welding and oxygen/acetylene cutting operations (torch cutting, brazing, welding) involves the use of an exposed high-temperature flame. This flame produces infrared (IR) radiation and UV radiation at the welding location which can cause cataracts, skin cancer, and thermal burns to the welder or other persons located nearby.

4.5.3 Skin Protection

- Long sleeve, flame-resistant shirts and/or forearm length Nomex gloves will be worn;
- Leather welder's apron or equivalent protection;
- Long pants shall be worn during any hot work task;
- Welding screens shall be utilized where feasible to protect the general public or other unprotected employees.

4.5.4 Eye Protection

- A welder's helmet or goggles with the appropriate lens shade will be worn. Refer to

S3AM-208-PR1 Personal Protective Equipment.

4.6 Ultraviolet Radiation Protection

4.6.1 Broad-spectrum UV radiation is classified as a known human carcinogen. UV radiation can cause harmful effects from both chronic and acute exposures including reddening of the skin (regardless of skin tone), accelerated skin aging, and damage to the eyes (e.g., cataracts, retinal burns, or welder's flash), and sunburn. Employees may be exposed to UV radiation from natural sunlight or manmade sources such as germicidal lamps (e.g., UV groundwater treatment systems) and welding.

4.6.2 While not required, the completion of an exposure or UV risk assessment will assess the risk posed by UV at the site. Such an assessment can be included in the SH&E plan and as part of a Task Hazard Assessment (THA). Special consideration should be given to work activities at higher elevations as the intensity of UV exposures are significantly higher than at lower elevations. Typically, UV exposure can increase 4-5% for every 1000 feet ascended. Also, some medications (e.g., Tetracycline) can increase sensitivity to UV exposure.

4.6.3 Control measures will be implemented at a worksite according to the conditions and work performed.

4.6.4 Engineering Controls

- Operations producing IR or UV radiation may be segregated or separated from other operations (e.g. use of automated systems, walls, screens, etc.);
- Employees will be encouraged to maximize use of the shade provided by trees, buildings, and other structures;
- Where there is limited access to natural shade, fixed or portable shade structures will be provided where practical;
- It is acknowledged that the provision of shade does not provide total protection from UV; therefore, it is recommended that outdoor workers adopt personal protection strategies such as protective clothing, sunscreen, and the wearing of hats in addition to using shade.

4.6.5 Administrative Controls

Consideration will be given to the reorganization of outdoor work programs to reduce UV exposure including, but not limited to:

- Use of the UV Index to assess UV hazards;
- Rescheduling work hours to enable workers to start earlier during May-September;

The UV Index, shown in Table 1, can help employees be aware of the expected level of UV radiation exposure on any given day.

Table 1. UV Index

Exposure Category	Index Number	Sun Protection Messages
Low	< 2	Wear sunglasses on bright days. In winter, reflections off of snow can nearly double UV strength. If you burn easily, cover up and use sunscreen.
Moderate	3-5	Take precautions, such as covering up and using sunscreen.
High	6-7	Protection against sunburn is needed.
Very High	8-10	Take extra precautions. Unprotected skin will be damaged and can burn quickly.
Extreme	11+	Take all precautions. Unprotected skin can burn in minutes.

4.6.6 Personal Protective Equipment

Employees who work outdoors shall provide and utilize personal outer clothing (e.g. shirt and trousers) that meets the established general clothing requirements per *S3AM-208-PR1 Personal Protective Equipment*. For those circumstances where the outer clothing requirements exceed the general clothing requirements, AECOM will provide the necessary clothing. The selection of appropriate protective clothing will take into account both the need to block UV and the need to reduce the effects of heat.

- Protective Clothing
    - Full length trouser pants and shirts that cover shoulders at a minimum (where practical, the fabric will have a close weave);
    - Where possible, clothing will be lightweight, loose fitting and have a collar;
    - Clothing and head wear with a sun (UV) protection factor (SFP) is encouraged but not required.
- Secondary hazards such as fire resistance will be considered.
- Head, Face, and Neck Protection
    - Hats provide shade and the larger the brim the greater the amount of shade that is provided;
    - Full brim hard hats are recommended (for additional protection, neck flaps are recommended);
    - In circumstances where the wearing of a broad-brimmed hard hat causes difficulties due to its size, sunscreen and other protective measures will be used.
- Eye Protection
    - Wrap-around, close-fitting, large safety glasses will reduce the amount of UV and glare that may pass around the edges of the glasses (the color or darkness of the lenses does not indicate the level of UV protection; therefore, verification with the manufacturer should be performed);
    - Safety glasses shall provide the level of protection appropriate to the potential non-ionizing radiation hazard exposures;
    - For hot work activities that may produce ultraviolet radiation, eye protection shall utilize the proper welding shade.
- Sunscreen
    - Sunscreen does not offer complete protection against the sun and should always be used in conjunction with other protective measures;
    - A broad spectrum and water-resistant sunscreen with a SPF of 30+, or a rating of no less than three stars, will be provided;
    - Expiration dates on the sunscreen will be regularly checked to confirm it has not expired per the manufacturer's instructions;
    - Sunscreen should be placed in an easily accessible location and employees instructed on the correct application and use;
    - Sunscreen should be generously applied to all areas of exposed skin at least 20 minutes before going outside and reapplied every two hours, or as needed by the work conditions.

4.7 Non-ionizing Radiation Training Program

4.7.1 Employees will receive training where the need for non-ionizing radiation control measures has been identified in the SH&E Plan and if developed, the Non-Ionizing Radiation Protection Plan.

4.7.2 Awareness training on the applicable non-ionizing radiation source will be provided to employees prior to the start of work in the area where the hazard exists as well as when employees are required to enter non-ionizing radiation Controlled Environments. Training curricula will be determined by the SH&E Department.

5.0 Records

5.1 Training records shall be maintained in accordance with *S3AM-003-PR1 SH&E Training.* RF emitter surveys will be maintained in applicable project files.

6.0 Attachments

6.1 None

Americas

Overhead Lines & Obstructions

S3AM-322-PR1

1.0 Purpose and Scope

1.1 Provides the safe work requirements to be observed where overhead obstructions (e.g., cable trays, pipe racks, etc.), overhead utilities, or other lines are present at a work location, including, but not limited to electric power lines, electrical apparatus, or any energized (exposed or insulted) parts, communication wires, or any other overhead wire or cable.

1.2 This procedure applies to all AECOM Americas**-**based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Arc Flash Hazard** – A dangerous condition associated with the possible release of energy caused by and electric arc. Arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury.

2.2 **Electrical Hazard** – A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

2.3 **Minimum Approach Distance (MAD)** – The MAD is the closest distance any employee or any part of the operating equipment is permitted to approach an energized or a grounded object.

2.4 **Qualified Person (Electrical Transmission and Distribution) –** A person trained and knowledgeable in the construction and operation of electrical transmission and distribution equipment or a specific work method, and has been trained to recognize and avoid electrical hazards that might be present with respect to that equipment or work method.

2.5 **Types of Overhead Lines / Obstructions (examples)**:

- Overhead electric power lines
- Structural cable supports
- Guy wires
- Cable television / communication lines
- Cable Trays
- Pipe Racks
- Low Clearance Overpasses

3.0 References

3.1 S3AM-004 PR1 Incident Reporting, Notifications & Investigation

3.2 S3AM-010-PR1 Emergency Response Planning

3.3 S3AM-209-PR1 Risk Assessment & Management

3.4 S3AM-302-PR1 Electrical Safety

3.5 S3AM-303-PR1 Excavation

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **Manager**

- Identify conditions where overhead electric power lines and other overhead obstructions may be present and outline what is required in the SH&E Plan and Task Hazard Assessments. Refer to the *S3AM-209-PR1 Risk Assessment & Management*.
- Confirm electrical and communication lines, and as appropriate other overhead obstructions, are identified on all site and project drawings.
- Coordinate and communicate with overhead electrical line owner or operator to identify and implement appropriate control measures.
    - Provide adequate advance notification to the Overhead Electrical Line Owner / Operator to allow for insulation or isolation and grounding of the line(s) if required.
    - Confirm the Overhead Electrical Line Owner / Operator(s) are fully informed as to when the operations are to begin, end and when any location changes are planned if applicable.
- Confirm Employees are trained as required for the scope of work and associated hazards.
- Coordinate and communicate with subcontractors or employees working around overhead electric power lines and as applicable, other overhead obstructions.
- Confirm the *S3AM-322-FM1 Overhead Electric power lines Acknowledgement* is completed by concurrent operations working around overhead electric power lines on the worksite.

4.1.2 **Safety Health & Environment (SH&E) Manager**

- Assist and support the Manager in planning and responding to concerns regarding the exposure to overhead electric power lines.

4.1.3 **Employees**

- Maintain current training required for the scope of work and associated hazards.
- Inform the Manager of location conditions that may expose risks to overhead electric power lines.
- Comply with established minimum approach distances.

4.2 Training

4.2.1 The Manager shall confirm all Employees are oriented to the SH&E Plan and Task Hazard Assessment (THA) process, in accordance with *S3AM-209-PR1 Risk Assessment & Management*.

4.2.2 Confirm training requirements were met prior to work starting.

-
- Employee orientation shall include the Location Specific Emergency Response Plan.
- Proof of training and orientation shall be documented and retained in the project files.

4.2.3 Managers shall confirm that each Employee has received training required for the scope of work and associated hazards in accordance with *S3AM-003-PR1 SH&E Training*.

4.2.4 Additional training requirements may include, but are not limited to:

- The limitations of an insulating link / device, proximity alarm, and range control (and similar) device, if used.

- Grounding and bonding procedures.
- Client specific requirements

4.3 General Requirements

4.3.1 The AECOM Manager or supervisor and employees shall perform a walk-thru of the work site and / or review of the work area / travel route to identify the overhead electric power lines and any other overhead obstructions that could be impacted by the work. Consider high profile equipment, equipment in transport, swing radius of equipment, potential for shifting loads, etc. AECOM personnel may be accompanied by other applicable personnel (e.g. client representatives, contractors operating concurrently, etc.).

4.3.2 The location or project specific SH&E Plan shall identify all overhead line hazards and provide suitable methods of elimination or control. All involved or affected workers shall review the SH&E Plan to confirm proper communication of the overhead line hazards and awareness of the control measures associated with their work.

4.3.3 Assess applicable factors such as, but not limited to:

- Scope of work (e.g. hoisting materials, excavation, grubbing, etc.).
- Transportation route.
- Hoisting, excavating, or other equipment to be operated.
- Height, placement, and reach of equipment.
- Equipment or material loading / unloading.
- Location(s) of electric power lines, communication lines, guy wires, etc.
- Worker training and experience.
- Soil or ground condition and environmental conditions.
- Interruptions to electrical services.
- Hazard to public.
- Use of ladders.
- Pipe and other conducting materials.
- Notification of electric utility owner.
- Changing conditions.
- Communication of all hazards to all workers including contractors, sub-contractors, and concurrent operations.

4.3.4 Task Hazards Assessments (THAs) shall be completed to record the hazards and control measures specific to the task, including those related to overhead line and obstructions hazards, prior to undertaking assigned tasks. THAs shall be reviewed and signed by all workers involved in the specific task.

4.3.5 Should adverse weather conditions cause the work associated with overhead lines to be unsafe, the activities shall be discontinued.

4.3.6 Managers or designated employees shall formally notify all concurrent operations, or any others who may not have had reason to review and sign the related SH&E Plan or THAs, of work that is to be done in the vicinity of overhead lines at distances less than 50 feet (15.25 meters), and for non-electrical obstructions, at distances less than 10 feet (3.05 meters) if appropriate to the obstruction’s potential hazards, and obtain the operator's assistance in protecting workers involved.

- Formal notification may be accomplished through a review of the SH&E Plan or THAs by the concurrent operator and associated personnel, as evidenced by signing the respective document's acknowledgement.
- Alternately, the concurrent operations may acknowledge having reviewed AECOM's procedures with a separate acknowledgment form. *S3AM-322-FM1 Overhead Electric Power Lines Acknowledgement Form* or equivalent may be used.
- Prior to equipment operation within 10 feet (3.05 meters) of non-electrical obstructions, as appropriate to potential hazards associated with the obstruction, the Owner/Operator should be contacted to obtain specific details regarding the obstruction such as piping or tray contents,

4.3.7 Overhead lines are presumed to be energized unless the Overhead Electrical Line Owner / Operator confirms that the overhead line has been, and continues to be de-energized and visibly grounded at the worksite.

4.3.8 Overhead lines are presumed to be uninsulated unless the Overhead Electrical Line Owner / Operator or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution confirms that a line is insulated.

4.3.9 Confirm accurate measurement of load heights, maximum equipment radius and height or reach of any other equipment that could potentially encroach on the safe limit of approach for the overhead electrical line,guy wires, or other applicable overhead obstructions.

- The height of all applicable overhead lines and obstructions that pose contact or encroachment potential shall be determined prior to work commencing.
- The height of electric power lines may only be determined by the client, utility company professional, or by using an approved electronic measuring device.
- Awareness shall be maintained for any elements that could affect clearance (e.g. snow pack, ice or snow weighing down lines, excessive heat causing sag, etc.).
- Caution shall be exercised when working or travelling near overhead lines having long spans, since they tend to be more prone to lateral swing in response to the wind and can present a contact hazard.
- All low hanging communication lines in close proximity to energized lines shall be clearly identified as *Encroaching on Energized Lines.*

4.3.10 Managers shall contact the overhead owner/operator (i.e. local utility company) if work is to be done or before equipment is operated within 50 feet (15.25 meters) of an energized overhead line, to determine the voltage of the overhead line and establish the appropriate MAD.

- All inquiries regarding electric utilities shall be made in writing and a written confirmation of the outage / isolation shall be received by the appropriate AECOM Manager prior to the start of the task that may impact the utility.

4.3.11 Until the voltage of the overhead electrical line is known and the MAD established, an exclusion zone shall be created at ground level beneath and 50 feet (15 meters) perpendicular to the overhead electric power lines on each side.

- The exclusion zone shall be demarcated with visual indicators (e.g., signage, flagging, paint, cones). No equipment shall enter the exclusion zone without approval from AECOM management.
- Unqualified employees shall maintain a safe clearance distance in accordance with the established MAD when working in an elevated position near energized overhead lines. For additional information associated with Qualified Employees refer to *S3AM-302-PR1 Electrical Safety*.

4.3.12 The Minimum Approach Distance (MAD) as it relates to Voltage varies from jurisdiction to jurisdiction. The MAD or the regulatory minimum distance requirements, whichever is more stringent, shall be maintained. The below chart shows the Phase-to-Phase voltage rating voltages in kilovolts and the MADs applicable to all AECOM operations:

Minimum Approach Distances (MAD)

Voltage Range (Kilovolts) (Phase-to-Phase)	Minimum Approach Distance (MAD) in Feet (Meters)
Personnel shall allow for equipment movement and electrical line swaying when establishing a M.A.D.	
0 – 50 KV	10 (3)
Over 50 – 200 KV	15 (5)
Over 200 – 350 KV	20 (6)
Over 350 – 500 KV	25 (8)
Over 500 – 750 KV	35 (11)
Over 750 – 1,000 KV	45 (14)
Note: This requirement shall apply except where client, local, or governmental regulations are more stringent.	

Source: American National Standards Institute, Publication B30.5.

4.3.13 An appropriate distance shall be kept between equipment, its occupants, their tools and energized overhead lines, electrical apparatus, or any energized parts.

4.3.14 These minimum approach distances do not apply to a load, equipment, or building that is transported under energized overhead power lines if the total height, including equipment transporting it, is less than 13.5 feet (4.15 meters).

- If the travelling equipment, including load, is over 4.15m (13.62ft) a transportation permit shall be acquired from the appropriate jurisdiction to travel on any public road or highway.
    - Consult local jurisdiction as some US states may use heights of up to 4.45m (14.6ft).
    - Notification of appropriate utility companies may be required in conjunction with the transportation permit. Jurisdictional requirements shall be verified prior to transport.
    - Route shall be checked for clearance of overhead electrical and communication lines prior to transport.
    - A designated signaler will be utilized when the height of the equipment, buildings, tractor / trailers or any other transport equipment travelling under an overhead electrical line is greater than 4.15m (13.62ft).

4.3.15 Employees shall not place earth or other material under or beside an electrical overhead line if doing so reduces the safe clearance to less than 50 feet (15.25 meters) or, if appropriate to potential hazards associated with other types of overhead obstruction, less than 10 feet (3.05 meters). To maintain a safe distance:

- Install warning devices and signs (hang a sign from and mark all guy wires to warn traffic of low clearance; provide warning signage for all overhead services).
- Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.
- Position signs or other devices to determine the “Danger Zone”.

- Inform all job site personnel of the danger zone and the safe distances required.
- Beware of atmospheric conditions, such as temperature, humidity, and wind that may dictate more stringent safety procedures.

4.3.16 If employees are to climb or perform work on poles or towers, the structures shall be confirmed as capable of withstanding the weight and activity without failure.

4.3.17 If holes are dug for poles or foundations for structures, appropriate measures shall be taken to prevent inadvertent entry by personnel or equipment. Refer to *S3AM-303-PR1 Excavation*.

4.3.18 Operation of heavy equipment and cranes in areas with overhead lines represents a significant arc flash and electrical hazard to all personnel on the job site.

- Accidental contact with an energized overhead line or arcing between a high power line and grounded equipment, can cause harm to nearby equipment operators or ground personnel and damage to power transmission systems and / or operating equipment.
- Equipment will be repositioned and blocked so that no part, including cables, can come within the established minimum clearances.

4.3.19 Gravel trucks, cranes, boom trucks, etc. shall retract, stow and lower boxes, outriggers, booms, etc. to the travel position prior to entering municipal and client owned roads (e.g. leaving plant sites, work over rig sites, battery sites, and storage yards) and any time travel may put the equipment within the MAD of an electrical line.

4.3.20 When a signal person is required, the individual shall wear reflective striping (coveralls or vest) and carry an air horn or other appropriate means of emergency communication.

4.3.21 The signal person shall be aware of the potential electrical line hazards, be verified as competent by their supervisor and not have any other duties while acting as the signal person.

4.3.22 The signal person shall remain outside the MAD and in a position that allows for monitoring of equipment or loads to prevent encroachment on the MAD.

4.3.23 Signs, pylons, high visibility tape and / or signalers shall not be removed until the last piece of AECOM equipment has traveled under the overhead electrical line.

4.4 Minimum Approach Distance (MAD) Reduction

4.4.1 Where any work task will not allow the MAD to be maintained, an alternate means of protection shall be implemented by the Manager and approved by the SH&E Manager. In order of preference, acceptable procedures are:

- De-energize the overhead line(s) / lockout by local utility authorities; or
- Implement alternative procedures as identified by the Overhead Electrical Line Owner / Operator or a registered professional engineer.

4.4.2 De-energize Overhead Lines

- Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site overhead lines are often under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the Overhead Electrical Line Owner / Operator. De-energizing of an overhead line often requires advance coordination with the Overhead Electrical Line Owner / Operator. At least one week advance notice should be provided.
- Managers shall confirm with the utility Overhead Electrical Line Owner / Operator that the overhead line has been de-energized and visibly grounded at the job site.

4.4.3 Alternative Procedures

- Managers may implement alternative procedures to prevent arc flash and electrical contact. These procedures shall be identified by the Overhead Electrical Line Owner / Operator or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution.
- A planning meeting with the Manager, SH&E Manager and the Overhead Electrical Line Owner / Operator (or registered Professional Engineer) shall be held to determine the most effective alternative procedures.
- Alternative procedures shall meet all client, local and governmental regulatory requirements.
- The work will be conducted by qualified and competent individuals, following the alternative written safe work procedures. All others are restricted from entering the MAD.
- Insulating Barriers shall be rated for the voltage line being guarded. These barriers may not be part of or attached to the equipment. The MAD shall only be reduced within the designed working dimensions of the insulating barrier. This determination shall be made by a Qualified Person in accordance with local or governmental requirements for work practices near energized equipment.
- Consult *S3AM-302-PR1 Electrical Safety* procedures to properly ground equipment and for limitations of grounding.
- Dedicated Line Spotters shall be trained to enable them to effectively perform their task, including training on the applicable local and governmental regulations.
- No work that encroaches on an energized power line will be completed outside of daylight hours.

4.5 Additional Safety Measures.

4.5.1 When equipment shall repeatedly travel beneath electric power lines, a route shall be plainly marked and “rider poles” of non-conductive material shall be erected on each side to confirm equipment structures are lowered into a safe position.

- 20” X 28” (50.8cm X 71.12cm) Danger Overhead Power Lines signs, which are highly visible, shall be erected at a height of 1.8 meters (6ft) on each side of the electrical line. A combination of pylons and high visibility tape shall be placed underneath the electrical line.
- These signs shall be in plain view of equipment traveling in either direction, but no closer than the MAD.
- If physical guards (i.e. goal posts, rider poles) are used, the guards shall be of non-conductive material and consist of a pole on each side of the approach connected by a rope.
- The poles will be placed at the MAD from and on each side of the electrical line. The ropes will be set at a height, which will maintain the MAD from the electrical line.

4.5.2 Watch for uneven ground that may cause vehicles and equipment to weave, bob, or bounce.

4.5.3 The following additional safety measures shall be implemented as needed when working around energized power lines:

- Provide equipment with proximity warning devices. These provide an audible alarm if any part of the equipment gets too close to a line.
- Install ground safety stops. These prevent vehicles from accidentally entering hazardous areas.
- Equip cranes with a boom-cage guard. This prevents the boom from becoming energized if an electrical line is contacted.

- Utilize insulated links and polypropylene tag lines. These prevent the transmission of electricity to loads or tag line handlers if an electrical line is contacted.

  NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures outlined in this document.

4.6 Emergency Planning

4.6.1 Managers shall complete a location specific emergency response plan as part of their location or project specific SH&E Plan for all operations during which equipment is operated within 50 feet (15.25 meters) of an energized overhead electrical line or conductor. Refer to *S3AM-010-PR1 Emergency Response Planning*. This plan shall identify the following information:

- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The potentially energized zone around the equipment.
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- The means to de-energize the electrical line or live conductor.
- The contact information for the utility Overhead Electrical Line Owner / Operator and emergency services.

4.6.2 In the event of an incident, the Employee shall report it in accordance with *S3AM-004 PR1 Incident Reporting, Notifications & Investigation.*

4.6.3 All damaged utilities shall be repaired by a qualified and / or licensed professional.

5.0 Records

5.1 Retain the Overhead Electric power lines Acknowledgement forms and any document related to requests of and confirmation from the Overhead Electrical Line Owner / Operator in the project files. Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

6.0 Attachments

6.1 S3AM-322-FM1 Overhead Electric Power Lines Acknowledgement Form

Americas

Overhead Electrical Lines Acknowledgment

S3AM-322-FM1

Company Information		
Name of Employer or Contracting Operation:		
Address:		
City:	**Province:**	**Postal Code:**
Telephone:	**Fax:**	
Project / Location Name:		
AECOM Contact Name:		

Acknowledgement		
I acknowledge that I have received a copy of *S3AM-322-PR1 Overhead Lines* and any other AECOM documentation related to the overhead electrical lines. List any additional documentation received: I understand that this worksite may have Overhead Electrical Hazards, and I have discussed the received documentation with all of our company staff who will be on this site.		
Name & Title (Print)	**Signature**	**Date**

Americas

Respiratory Protection

S3AM-123-PR1

1.0 Purpose and Scope

1.1 This procedure establishes a written respiratory protection program with the required elements and work site-specific procedures for respirator selection, use, and maintenance for any workplace where respirators are necessary to protect the health of an Employee.

1.2 The primary objective shall be to prevent exposure to atmospheric contaminants as far as feasible by accepted engineering control measures (e.g. enclosure or confinement of the operation, general and local exhaust ventilation [LEV], and substitution of less toxic materials). If respiratory hazards remain, suitable administrative controls and respiratory protective equipment requirements shall be established.

1.3 This procedure applies to all AECOM Americas-based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, except where local or governmental regulations are more stringent**.**

2.0 Terms and Definitions

2.1 **Action Level (AL)** – An airborne concentration of a potentially toxic or hazardous substance, measured in parts per million by volume (ppm), microgram per cubic meter (µg/m3) milligram per cubic meter (mg/m3) or fibres per cubic centimetre (f/cc), that triggers certain provisions as required by the applicable jurisdictional legislation. In many cases the action level is 50% of the established exposure limit.

2.2 **Air-purifying respirator** – A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

2.3 **Approved** – Equipment tested and listed by the Bureau of Mines, jointly by the Mining Enforcement and Safety Administration (MESA), and the National Institute for Occupational Safety and Health (NIOSH), or jointly by the Mine Safety and Health Administration (MSHA) and NIOSH. Please note Canadian Standards Association (CSA) bases respirator selection on NIOSH criteria for the testing and certification of respirators.

2.4 **Assigned protection factor (APF)** – The ratio of the ambient concentration of an airborne substance (outside the respirator) to the concentration of the substance inside the respirator.

2.5 **Atmosphere-supplying respirator** – A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, including supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

2.6 **Breakthrough** – The first perception of an odor, taste or irritation experienced while wearing an air-purifying respirator. Breakthrough is generally an indication that the cartridges are saturated and are no longer filtering out the contaminant. Breakthrough can also be an indication of an improperly functioning respirator.

2.7 **Established Exposure Limit** – The maximum regulatory exposure concentration to which an individual may be exposed to for an 8- hour time weighted average (TWA).

- This limit is referred to by different terminology depending upon the given jurisdiction (e.g. Permissible Exposure Limit (PEL), Contamination Limit, Occupational Exposure Limit (OEL), Threshold Limit Value (TLV), etc.).
- Acceptable methods of adjusting this limit to correspond to a different exposure period (e.g. 10 hours) vary by jurisdiction and substance.

2.8 **Filtering facepiece (dust mask)** – A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

2.9 **Fit factor** – A quantitative estimate of the fit of a particular respirator to a specific individual, typically estimating the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

2.10 **Fit test** – The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test [QLFT] and Quantitative fit test [QNFT].)

2.11 **Hazardous atmosphere** – Any atmosphere, either immediately or not immediately dangerous to life or health, that is oxygen-deficient or that contains a toxic or disease-producing contaminant exceeding the legally established permissible exposure limit or, where applicable, the Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists.

2.12 **Immediately dangerous to life or health (IDLH)** – An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

2.13 **Maximum use concentration (MUC)** – The maximum concentration of an airborne contaminant from which an employee is expected to be protected when wearing a respirator, determined by the assigned protection factor of the respirator or class of respirators and the occupational exposure limit for that contaminant. The MUC is usually determined mathematically by multiplying the assigned protection factor (APF) specified for a respirator by the established exposure limit, which can include a short-term exposure limit and a ceiling limit or any other exposure limit used for that chemical agent, as defined by the authority having jurisdiction.

MUC = APF x established exposure limit

2.14 **Negative pressure respirator (tight fitting)** – A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

2.15 **Oxygen-deficient atmosphere –** An atmosphere with oxygen content below 19.5 percent by volume.

2.16 **Physician or other licensed health care professional (PLHCP)** – An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services required by local or governmental respiratory protection standards.

2.17 **Positive pressure respirator** – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

2.18 **Powered air-purifying respirator (PAPR)** – An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

2.19 **Pressure demand respirator** – A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

2.20 **Qualitative fit test (QLFT)** – A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

2.21 **Quantitative fit test (QNFT)** – An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

2.22 **Self-contained breathing apparatus (SCBA)** – An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

2.23 **Supplied-air respirator (SAR) or airline respirator** – An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

2.24 **Tight-fitting facepiece** – A respiratory inlet covering that forms a complete seal with the face.

2.25 **User seal check** – An action conducted by the respirator user to determine if the respirator is properly sealed to the face.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-114-PR1 Compressed Gases

3.3 S3AM-128-PR1 Medical Screening & Surveillance

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Respiratory Protection Program Administrator**

The Respiratory Protection Program Administrator will be established at each project/location where employees are required to wear respirators. The Respiratory Protection Program Administrator will:

- Verify full compliance with this procedure.
- Assist with the arranging of any required medical evaluations or any other additional medical attention related to the use of a respirator.
- Perform or arrange suitable providers to perform the program evaluations described in this procedure.
- Maintain required inspections and testing/certifications of SCBA units

4.1.2 **Manager /Supervisor**

- Verify compliance with the respiratory protection program set forth in this procedure.
- Verify that only those employees who are medically qualified, properly trained, and fit tested are assigned to respirator work.
- Verify that respirators are provided, repaired, or replaced as may be required due to wear and deterioration.
- Confirm that the emergency rescue service is available to respond prior to any employees entering the IDLH area.

4.1.3 **SH&E Manager (or designee)**

- Monitor compliance with the various aspects of this program.
- Provide technical assistance regarding respirator selection and use, evaluate the effectiveness of this program, and support respirator training and fit testing (e.g. determine cartridge change out schedule for negative air respirators).
- Audit company compliance with this procedure.

4.1.4 **Employee**

- Use respiratory protection in accordance with instructions and training received.
- Maintain the respirator in accordance with this procedure and the manufacturer's instructions.
- Immediately report any malfunction of the respirator to the Supervisor or Manager or other responsible person.
- For employees who wish to wear respirators on a voluntary basis when not required to by AECOM or a regulatory agency, the employee shall complete *S3AM-123-FM2 – Voluntary Use of Respirators* or an equivalent form.

4.2 Training

4.2.1 Employees who wear respiratory protection shall receive training before they are assigned to a task that requires the use of respiratory protection.

4.2.2 Employees that may be exposed to a respiratory hazard will be instructed on the hazard and the controls prior to beginning work.

4.2.3 Atmospheric testing will be carried out by qualified personnel trained in the use, calibration, and interpretation of the test equipment.

4.2.4 Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the Employee's knowledge or use of the respirator indicate that the Employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to verify safe respirator use.

4.2.5 Basic Respirator Training Program

Respirator training classes will include, at a minimum, the following**:**

- Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used;
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- The limitations and capabilities of the respirator;
- Proper fitting, including demonstrations and practice in wearing, adjusting, determining the fit of, and performing a user seal check each time respirator is donned. Refer to *S3AM-123-ATT1 Fit Testing Protocol*, *S3AM-123-FM1 Respiratory Equipment Fit Test* and *S3AM-123-ATT2 User Seal Check*;
- How to inspect, put on, use and remove the respirator;
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- The procedures for maintenance and storage of the respirator;
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- The general requirements of local or governmental Respiratory Protection Standards.

4.3 Medical Surveillance

4.3.1 No Employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator.

4.3.2 Prior to wearing a respirator and in accordance with the applicable jurisdictional requirements, Employees shall complete medical screening to identify any relevant psychological or physiological impediments to respiratory protection use. Screening may require an initial baseline medical surveillance examination, based on jurisdictional requirements or screening results, performed by a PLHCP in accordance with the requirements of *S3AM-128-PR1 Medical Screening & Surveillance Program.*

4.3.3 Additional medical examinations will be provided to employees who wear respirators when:

- An Employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, Supervisor, or the Respiratory Protection Program Administrator determines that an Employee needs to be reevaluated;
- Information from the Respiratory Protection Program, including observations made during fit testing and program evaluation, indicates a need for Employee reevaluation; or

- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature, etc.) that may result in a substantial increase in the physiological burden placed on an Employee.

4.3.4 All medical surveillance examinations shall be at no cost to the employee and occur during normal working hours; shall be convenient, understandable, and confidential; and the Employee will be given the chance to discuss results with examining physician.

4.4 Respirator Selection

4.4.1 The location or project specific SH&E Plan shall identify applicable respiratory hazards and develop appropriate controls, which may include respiratory protection. If respiratory protection is necessary the SH&E Plan shall detail the requirements.

4.4.2 SH&E Managers or his/her designated representative shall select and provide an appropriate respirator based on:

- The respiratory hazard(s) to which the employee may be exposed, including oxygen deficiency. Identify potential contaminants, concentrations, and the physical state of airborne contaminants:
    - Particulates (dust, fibers, micro-organisms, smoke, fumes).
        - Indicate the presence of any oil in particulate hazards. (may be produced by motor vehicles, air compressor systems using oil lubricators) If unknown, oil shall be assumed to be present.
    - Vapor and gases
        - Gases which may produce an oxygen deficiency (i.e. helium, argon, carbon monoxide and nitrogen).
        - Gases which are acids or produce acids when in contact with moisture (i.e. sulphur oxides, carbon dioxide, hydrogen chloride).
        - Gases which are alkaline or produce alkalis in reaction with moisture (i.e. ammonia, amines, phosphine).
        - True gases or vapors from evaporation of organic liquids (i.e. acetone, toluene, benzene).
        - Metal reacted with an organic compound (i.e. tetra-ethyl lead: was used in leaded fuel and still in aviation fuel, organic phosphates).
        - Mercury vapor.
        - Radon.
- The eye and face hazards to which the employee may be exposed (absorption, irritant, impact).
- Workplace or user factors that may affect respirator performance and reliability.

4.4.3 SH&E Managers or his/her designated representative shall identify and evaluate the respiratory hazard(s) in the workplace. Evaluations shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.

4.4.4 Respiratory protection is required for those operations in which engineering controls or work practice controls are not feasible to reduce toxic or hazardous substance exposure at or below the AL (or if applicable, established exposure limit).

4.4.5 Where the employee exposure cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH.

4.4.6 Only approved respirators shall be selected and they shall be used in compliance with the conditions of their certification.

4.4.7 Respirators shall be selected from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

4.5 Fit Testing Procedures

4.5.1 After the medical assessment is complete, employees using a tight-fitting respirator shall pass an appropriate QLFT or QNFT prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually (or as required by the applicable jurisdiction) thereafter. Refer to *S3AM-123-ATT1 Fit Testing Protocol*.

4.5.2 Fit testing shall be performed using the same make, model, style and size of respirator the user would be expected to use.

4.5.3 Should the fit test fail, alternative makes, models, styles and sizes shall be tested to find a correct fit for the user.

4.5.4 Respiratory protective equipment shall not be used unless a satisfactory fit test has been achieved for that particular equipment.

4.5.5 Fit testing shall also verify user competency in donning, doffing, inspecting and performing of seal checks.

4.5.6 Additional fit tests will be performed:

- Whenever there is an indication that changes in the Employee's physical condition might have an effect on respirator fit (such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight);
- If the Employee notifies his/her Supervisor or SH&E Manager that the fit of his/her respirator is unacceptable.

4.6 Interference with Facepiece Seal

4.6.1 AECOM shall not permit respirators with tight-fitting facepieces to be worn by Employees who have:

- Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
- Any condition that interferes with the face-to-facepiece seal or valve function.

4.6.2 If an employee wears corrective glasses or goggles or other personal protective equipment, the Supervisor or Manager shall confirm that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

4.6.3 Employees shall perform a user seal check each time they don the respirator. Refer to *S3AM-123-ATT2 User Seal Check Procedures*.

4.7 Specification of Proper Level of Respiratory Protection

4.7.1 The SH&E Manager or his/her designated and qualified representative shall provide guidance on the proper selection and use of all respiratory protective devices, including half-face and full-face air purifying respirators, airline respirators, and self-contained breathing apparatus. This information is generally specified as part of the written site-specific SH&E plan and Task Hazard Assessment (THA).

4.7.2 Employees engaged in activities not covered by a THA or SH&E plan shall stop work and consult with the SH&E Manager or his/her designated representative to determine the proper equipment to use prior to resuming activities. Whenever appropriate, exposure levels will be measured to verify that the actual use conditions are within the limitations of the approvals specified by NIOSH/MSHA for the selected respirator.

4.8 Cartridges

4.8.1 NIOSH certifies three classes of filters*:

Three categories of resistance to filter efficiency degradation:	Three levels of filter efficiency:
N (**N**ot resistant to oil)	95% (called “95”)
R (**R**esistant to oil)	99% (called “99”)
P (oil **P**roof)	99.97% (called “100”)

*Filters are available in any combination of the above.

4.8.2 Generally cartridge color denotes the type of contaminant the cartridge was designed to filter:

Olive:	Multi-contaminant
White:	Acid gas
Black:	Organic vapors
Green:	Ammonia gas
Yellow:	Acid gas and organic vapors
Blue:	Carbon Monoxide
Purple (Magenta):	Radioactive material, except tritium & noble gases
Purple:	Any particulates - P100
Orange:	Any particulates - P95, P99, R95, R99, R100
Teal:	Any particulates free of oil - N95, N99, or N100

Please note; this is only a basic listing and should only be used as a reference. Combinations, deviations or additional types may be encountered. To ensure proper cartridge selection consult the cartridge supplier to ensure applicability to the contaminant(s) anticipated

4.8.3 Filter cartridges shall be changed out whenever an increase in breathing resistance is detected by the user.

4.8.4 When available, chemical cartridges that are equipped with end-of-service life indicators (ESLI) shall be utilized. In those cases, cartridges should be changed when indicated by the ESLI. A buddy system should be used so coworkers can monitor each other’s cartridge color condition.

4.8.5 In the absence of cartridges equipped with an ESLI, employees shall change chemical cartridges on the following schedule:

- Immediately if breakthrough is perceived or if resistance to breathing is detected by the user; and
- In accordance with the change out schedule based upon the anticipated contaminant concentration, environmental conditions, employee work rate, and the specific data provided by manufacturer.

4.8.6 When PAPRs are worn, the same rules apply with the exception that filter cartridges should be changed when airflow through the filter elements decreases to an unacceptable level, as indicated by the manufacturer’s test device.

4.9 Air-Supplying Respirator Use

4.9.1 Air-supplying respirators will be specified for use when it has been determined that any of the following conditions exist:

- The oxygen concentration is less than 19.5 percent;
- The contaminant is unknown or its concentration cannot be quantified;
- The airborne contaminant concentration is above its IDLH;
- An air-purifying respirator canister or cartridge that removes the contaminant is not available;
- The contaminant concentration is above the concentration for which an air-purifying canister or cartridge is approved; or
- The contaminant concentration is above the MUC of a full-face air-purifying respirator.

4.9.2 No Employee may engage in an operation requiring the use of an air-supplied respirator unless the SH&E Manager or his/her designated representative has reviewed the operation and approved its use.

4.9.3 The determination of the type of air-supplying respirator (i.e., SCBA, airline, demand, pressure demand, etc.) appropriate for the job, outside standby persons, communication, proper training and equipment, notification procedures, and necessary action should be part of the THA or SH&E Plan. Mandatory equipment including SCBA or SAR with auxiliary air supply and emergency appropriate retrieval equipment or equivalent rescue means shall be made by the SH&E Manager or his/her designated representative at the time of the THA or SH&E Plan review. The need for any additional precautions (i.e., equipment specific training, on-site health and safety support, etc.) shall also be determined by the SH&E Manager or his/her designated representative.

4.10 Minimum Procedures for IDLH Atmospheres

4.10.1 One Employee or, when needed, more than one Employee shall be located outside the IDLH atmosphere. This employee shall be responsible for communicating with the Employees in the IDLH atmosphere, alerting rescue services if needed, and restricting entrance to the IDLH area by untrained and unapproved persons.

4.10.2 Visual, voice, or signal line communication shall be maintained between the Employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

4.10.3 The Employee(s) located outside the IDLH atmosphere shall be trained and equipped to provide effective emergency rescue or to initiate on-site rescue services.

4.10.4 If on-site rescue services are to be used, the Manager or Supervisor shall confirm that the service is available to respond prior to any employees entering the IDLH area.

4.10.5 Employee(s) located outside the IDLH area and/or on-site rescue services shall be equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment would create a hazard to the Employees in the IDLH area.

4.11 Breathing Air

4.11.1 Compressed air used for respiration shall be of high purity and shall meet, as a minimum, the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1).

4.11.2 Oxygen shall NOT be used as a source of breathing air at any time in open-circuit SCBAs or airline respirators.

4.11.3 Compressor Supplied Breathing Air

- All compressors used for filling SCBA air cylinders or for supplying airline respirators shall be equipped with the following safety and standby devices:
    - The compressor intake shall be located to verify that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
    - Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
    - A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere shall be provided.
- If an oil-lubricated compressor is used to supply breathing air, it shall be equipped with both of the following devices:
    - A continuous reading carbon monoxide monitoring system set to alarm should the carbon monoxide concentration exceed 10 parts per million; and,
    - A high temperature alarm which will activate when the discharge air exceeds 110 percent of the normal operating temperature in degrees Fahrenheit.
- An in-line purifying filter assembly to remove oil, condensed water, particulates, odors, and organic vapors shall be used in conjunction with the air compressor.

4.11.4 Compressed Air Cylinder Systems for Airline Respirators

- Compressed air cylinders shall meet the requirements of *S3AM-114-PR1 Compressed Gases*.
- Compressed air cylinder systems used to supply airline respirators shall be equipped with low pressure warning bells (e.g., Scott Pak-Alarm) or similar warning devices to indicate air pressure in the manifold below 500 pounds per square inch (psi). When such systems are used, one employee shall be assigned as safety standby within audible range of the low pressure alarm.
- Airline hose couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying airline respirators with non-respirable gases or oxygen.
- The air pressure at the hose connection to airline respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.
- Routine inspection and maintenance of the air compressor shall be performed.

4.11.5 Compressed Air Cylinder Systems for Recharging SCBAs

- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi.

4.11.6 Escape/Egress Units

- Escape/egress unit respirators are intended for use in areas where escape with a short-term (minimum 5 minutes) air supply is necessary. It is important that escape bottle size be provided that will allow the employee to get to a safe location considering breathing rate and distance.
- Escape bottles are required on air-line respirators used in IDLH and high hazard work conditions.
- They may be used as adjuncts to airline pressure demand respirators as a backup air supply or as independent emergency devices in areas where respiratory protection is not normally required.

- Appropriate training shall be conducted and documented prior to assigning Employees to tasks or locations subject to the use of these respirators.
- Escape/egress units (minimum 5 minutes) shall never be used to enter a hazardous atmosphere or as primary standby respirators for confined space entry.

4.12 Respirator Inspection, Cleaning, Maintenance, and Storage

When respirator use is required, only properly cleaned and maintained NIOSH/MSHA approved respirators shall be used.

4.12.1 Inspection

- Respirators should be inspected before and after use using *S3AM-123-FM3 Respiratory Equipment Inspection*, or equivalent. The respirator should not be used and removed and marked out of service if any item on the checklist fails inspection.
- Respirators for emergency use should be inspected once per month.
- Defects shall be reported to their Supervisor or Manager. No defective respirator shall be issued or worn.

4.12.2 Cleaning and Maintenance

- Respirator facepiece assemblies shall be cleaned and sanitized minimally after each day of use in accordance with the requirements specified in *S3AM-123-ATT3 Respirator Cleaning*.
- The respirator should also be inspected for any damaged parts (repair should only be done by trained personnel with the proper tools).
- Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.
- Respiratory equipment shall be maintained according to manufacturer's instructions.
- In field situations, a pre-moistened towelette (e.g., baby wipes) can be used. The mask should then be rinsed with clean warm water and dried. Towelettes or wipes shall be compatible with the respirator materials.
- Alcohol should never be used to clean masks as it can damage the facepieces and rubber parts.
- Where respirators are assigned to individual employees, management shall verify compliance with cleaning and maintenance requirements by periodic inspection and field audits of respiratory equipment.

4.12.3 Storage

- Store clean respirators so that they are protected from dust, excessive moisture, damaging chemicals, temperature extremes and direct sunlight or UV light. They should be placed in a sealed plastic bag and stored in the original box or similar container which blocks light.

4.13 Hygiene

4.13.1 Employees shall leave the work area to wash, change cartridges, or if they detect breakthrough or resistance.

4.14 Costs

4.14.1 The costs for training, medical examinations, fit testing, respirators, spectacle kits, and cleaning materials should be considered as operational costs.

4.15 Program Evaluation

4.15.1 The SH&E Manager or his/her designated representative shall conduct evaluations of the workplace as necessary to verify that the provisions of the current written program are being effectively implemented and that it continues to be effective.

4.15.2 The SH&E Manager shall regularly (i.e., during annual training) consult Employees required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the Employee is exposed;
- Proper respirator use under the workplace conditions the Employee encounters; and
- Proper respirator maintenance.

5.0 Records

5.1 Medical records under this section shall be maintained at a minimum in accordance with *S3AM-128-PR1 Medical Screening & Surveillance.*

5.2 Fit Test Records shall be maintained in the Employee's health and safety records. *S3AM-123-FM1 Respiratory Equipment Fit Test*, or equivalent, will be used to document each fit test.

5.3 Training Records shall be maintained in accordance with *S3AM-003-PR1 SH&E Training***.**

6.0 Attachments

6.1 S3AM-123-ATT1 Fit Testing Protocol

6.2 S3AM-123-ATT2 User Seal Check

6.3 S3AM-123-ATT3 Respirator Cleaning

6.4 S3AM-123-FM1 Respiratory Equipment Fit Test

6.5 S3AM-123-FM2 Voluntary Use of Respirators

6.6 S3AM-123-FM3 Respiratory Equipment Inspection

Americas

Fit Testing Protocol

S3AM-123-ATT1

1.0 Selection

1.1 Fit testing shall not be conducted until after the medical screening and any medical examination is concluded, to confirm there are no relevant psychological or physiological impediments or restrictions to respiratory protection use. A medical examination may result in clearance to use any type of respirator, total restriction for respiratory equipment use, or specific respiratory use restrictions (e.g. powered air-purifying respirator (PAPR) only).

1.2 Employees are expected to present themselves for a fit test in the same condition as when using the respiratory protective equipment in their job. These conditions include hair style and whether or not make-up, face creams, glasses, contact lenses, and/or dentures would be used.

1.3 Employees shall confirm that no jewelry, head-coverings or other items could interfere with the fit and the face is clean shaven where a tight-fitting respirator is required to seal. Any PPE required to be used concurrently with the RPE that could affect the fit of a tight-fitting facepiece shall be utilized during the fit test.

1.4 The Employee shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the Employee.

1.5 Prior to the selection process, the Employee shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the Employee in evaluating the fit and positioning of the respirator. This instruction may not constitute the Employee's formal training on respirator use, because it is only a review.

2.0 Comfort

2.1 The Employee shall be instructed to hold each chosen face piece up to the face and to eliminate those that obviously do not give an acceptable fit.

2.2 The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least 5 minutes to assess comfort.

2.3 If the Employee is not familiar with using a particular respirator, he/she shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

2.4 Assessment of comfort shall include a review of the following points with the Employee and allowing he/she adequate time to determine the comfort of the respirator:

- Position of the mask on the nose;
- Room for eye protection;
- Room to talk; and
- Position of mask on face and cheeks.

3.0 Fit Test Criteria

3.1 The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension, not overly tightened;
- Fit across nose bridge;
- Respirator of proper size to span distance from nose to chin;

- Tendency of respirator to slip; and
- Self-observation in mirror to evaluate fit and respirator position.

3.2 The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, moustache, or sideburns that cross the respirator sealing surface. Any type of apparel that interferes with a satisfactory fit shall be altered or removed.

3.3 Before conducting the negative and positive pressure checks, the Employee shall be told to seat the mask on the face by moving the head from side to side and up and down slowly while taking in a few slow deep breaths. Another face piece shall be selected and retested if the Employee is unable to seat the mask.

3.4 The Employee shall conduct a user seal check, either the negative and positive pressure seal checks described in *S3AM-123-ATT2 User Seal Check* or as recommended by the respirator manufacturer that provide equivalent protection to the procedures in *S3AM-123-ATT2 User Seal Check*.

3.5 If an Employee exhibits difficulty in breathing or signs of claustrophobia or anxiety during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the Employee can wear a respirator while performing her or his duties.

3.6 If the Employee finds the fit of the respirator unacceptable, the Employee shall be given the opportunity to select a different respirator and to be retested.

4.0 Test Exercise Regimen

4.1 Prior to the commencement of the fit test, the Employee shall be given a description of the fit test and their responsibilities during the test procedure. The description of the process shall include a description of the test exercises that will be performed. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

4.2 The fit test shall be performed while the Employee is wearing any applicable safety equipment that may be worn during actual respirator use and that could interfere with respirator fit.

5.0 General Test Exercises

5.1 The following test exercises are to be performed for all fit testing methods prescribed in this procedure, except for the Controlled Negative Pressure (CNP REDON) method. A separate fit testing exercise regimen is contained in the CNP protocol. The Employee shall perform exercises, in the test environment, in the following manner:

5.1.1 **Normal breathing**. In a normal standing position, without talking, the Employee shall breathe normally.

5.1.2 **Deep breathing.** In a normal standing position, the Employee shall breathe slowly and deeply, taking caution so as not to hyperventilate.

5.1.3 **Turning head side to side.** Standing in place, the Employee shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the Employee can inhale at each side.

5.1.4 **Moving head up and down.** Standing in place, the Employee shall slowly move his/her head up and down. The Employee shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

5.1.5 **Talking.** The Employee shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The Employee can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

- Rainbow Passage. "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the

horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."

5.1.6 **Grimace.** The Employee shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

5.1.7 **Bending over.** The Employee shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT or QLFT units that do not permit bending over at the waist.

5.1.8 **Normal breathing**. In a normal standing position, without talking, the Employee shall breathe normally (this is the same as the first test).

5.2 Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds.

5.3 The Employee shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

5.4 The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test and the fit test shallt be repeated.

6.0 Qualitative Fit Test (QLFT) Protocols

6.1 General

6.1.1 QLFT test methods have been validated only for a fit factor of 100. A tight-fitting respirator operated in air-purifying (negative-pressure) mode can be tested by QLFT methods to validate a maximum APF of 10.

6.1.2 The maximum APF that can be applied for all tight-fitting respirators operated in air-purifying (negative-pressure) mode is 10 when fit tested using a QLFT method.

6.1.3 AECOM will confirm that persons administering QLFT are able to calibrate equipment and perform tests properly, recognize invalid tests, and confirm that test equipment is in proper working order.

6.1.4 AECOM will confirm that that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

6.2 Irritant Smoke (Stannic Chloride) Protocol

6.2.1 This QLFT uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

6.2.2 **General Requirements and Precautions**

- The test conductor has the option of donning an air purifying respirator to protect himself/herself from the test agent.
- The respirator to be tested shall be equipped with high-efficiency particulate air (HEPA) or P100 series filter(s).
- Only stannic chloride smoke tubes shall be used for this protocol.
- No form of test enclosure or hood for the Employee shall be used.
- The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the Employee's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the Employee can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the Employee.

- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

6.2.3 **Sensitivity Screening Check**

- The Employee to be tested shall demonstrate his or her ability to detect a weak concentration of the irritant smoke.
- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute or to an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
- The test operator shall advise the Employee that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the Employee to keep his/her eyes closed while the test is performed.
- The Employee shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the Employee's direction to determine that he/she can detect it.

6.2.4 **Irritant Smoke Fit Test Procedure**

- The Employee being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
- The Employee shall be instructed to keep his/her eyes closed.
- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the Employee, using the low-flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.
- If the Employee being tested has not had an involuntary response and/or has not detected the irritant smoke, proceed with the test exercises.
- The General Test Exercises shall be performed by the Employee while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of 6 inches.
- If the Employee being fit tested reports detecting the irritant smoke at any time, the test is failed. The Employee being retested shall repeat the entire sensitivity check and fit test procedure.
- Each Employee passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- If a response is produced during this second sensitivity check, then the fit test is passed.

6.3 **Isoamyl Acetate (IAA, Banana oil) Protocol**

6.3.1 This protocol is not not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator shall be equipped with an organic vapor filter.

6.3.2 **General Requirements and Precautions**

- As smoke can be irritating to some employees, this test method is preferred to reduce risk of irritation to the employee tested and the person conducting the fit test.

- The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.
- The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.
- The respirator to be tested shall be equipped with a P100 series filter (for organic vapors).

6.3.3 **Sensitivity (Odor threshold) Screening Check**

- Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of IAA at low levels.
- Obtain the following supplies required to complete the screening:
    - Three 1 liter glass jars with metal lids
    - Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions
- The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.
- The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.
- A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.
- The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.
- The employee shall then be asked to sniff each bottle and indicate which bottle contains an odor.
- If the employee is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

6.3.4 **Isoamyl Acetate (IAA, banana oil) Fit Test Procedure**

- The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.
- After successfully completing the odor threshold test and the positive and negative pressure checks, the employee shall don their respirator prior to moving to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.
- A copy of the prepared text from which the subject is to read may be taped to the inside of the test chamber or should be provided to the employee to hold.
- Upon entering the test chamber, the employee shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.
- Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

- If at any time during the test, the employee detects the banana-like odor of IAA, the test is failed. The employee shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
- If the test is failed, the employee shall return to the selection room and remove the respirator. The employee shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the employee shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.
- If the employee passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.
- When the employee leaves the chamber, they shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

6.3.5 **Other**

- Additional Qualitative fit testing methods may be used provided they adequately test breakthrough or leakage of the respirator and testing is conducted according to manufacturer specifications.
- Qualitative fit testing may be conducted using manufacturer supplied hoods or equivalent test enclosures, and nebulizers using suitable fit testing solutions (e.g. sodium saccharin, Bitrex®, etc.).

7.0 Quantitative Fit Test (QNFT) Protocols

7.1 **General**

7.1.1 A quantitative fit test measures the adequacy of a respirator's fit by numerically measuring the amount of leakage into the respirator. A minimum fit factor of 500, and in some cases 1000, is required for a successful quantitative fit test.

7.1.2 AECOM will confirm that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and confirm that test equipment is in proper working order.

7.1.3 Quantitative fit testing is applicable to all tight fitting respirators. Quantitative fit tests (QNFT) are required for all full-face masks and SCBA and multi-functional SCBA air-line configurations.

7.1.4 AECOM will confirm that QNFT equipment is kept clean and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

7.2 **Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol**

7.2.1 The ambient aerosol CNC quantitative fit testing (PortacountTM) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for QNFTs. A probed respirator has a special sampling device installed on the respirator to allow the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an Employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator, and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the Employee prior to the conduct of the screening test.

7.2.2 **Portacount Fit Test Requirements**

- Check the respirator to make sure the sampling probe and line are properly attached to the face piece and that the respirator is fitted with a particulate filter capable of preventing

significant penetration by the ambient particles used for the fit test (e.g., National Institute for Occupational Safety and Health, Title 42 Code of Federal Regulations 84 series 100, series 99, or series 95 particulate filter) according to the manufacturer's instructions.

- Instruct the Employee to be tested to don the respirator for 5 minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This Employee shall already have been trained on how to wear the respirator properly.
- Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; self-observation in a mirror to evaluate fit and respirator position.
- Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.
- Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
- The Employee shall be instructed to perform the exercises in General Test Exercises.
- After the test exercises, the Employee shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

7.2.3 **Portacount Test Instrument**

- The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
- Since the pass or fail criterion of the Portacount is Employee programmable, the test operator shall confirm that the pass or fail criterion meet the requirements for minimum respirator performance.
- A record of the test needs to be kept on file, assuming the fit test was successful. The record shall contain the Employee's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

Americas

User Seal Check

S3AM-123-ATT2

1.0 Requirements

1.1 The Employee who uses a tight-fitting respirator is to perform a user seal check to confirm that an adequate seal is achieved each time the respirator is put on.

1.2 Either the positive and negative pressure checks listed here or the respirator manufacturer's recommended user seal check method shall be used.

1.3 User seal checks are not substitutes for qualitative or quantitative fit tests.

1.4 If either the positive or negative pressure checks fail, do not use the respirator and mark it as out of service.

2.0 Facepiece Positive and/or Negative Pressure Checks

2.1 **Positive pressure check**

- Close off the exhalation valve and exhale gently into the facepiece.
- If a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal, the face fit is considered satisfactory
- For some respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

2.2 **Negative pressure check**

- Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold your breath for 10 seconds.
- The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. If this is the case, the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.
- If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

3.0 Manufacturer's Recommended User Seal Check Procedures

3.1 The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures, provided that the employer demonstrates that the manufacturer's procedures are equally effective.

Americas

Respirator Cleaning

S3AM-123-ATT3

1.0 Requirements

1.1 These procedures are general in nature. The cleaning recommendations provided by the manufacturer for a respirator may be used, provided such procedures are as effective as those listed here.

1.2 Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth (e.g., confirm that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user).

2.0 Procedures for Cleaning Respirators

2.1 Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

2.2 Wash components in warm (110 degree Fahrenheit [°F]; 43 degree Celsius [°C] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

2.3 Rinse components thoroughly in clean, warm (110°F [43°C] maximum), preferably running water. Drain.

2.4 When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:

- Hypochlorite solution (50 parts per million [ppm] of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110°F (43°C); or,
- Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45 percent alcohol) to one liter of water at 110°F (43°C); or,
- Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

2.5 Rinse components thoroughly in clean, warm (110°F [43°C] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

2.6 Components should be hand dried with a clean, lint-free cloth or air dried.

2.7 Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

2.8 Test the respirator to ensure that all components work properly.

2.9 After the fit test, wipe down the respirator with a sanitary swab.

2.10 Store the respirator according to manufacturer recommendations (e.g., away from direct sunlight, in a proper container to maintain cleanliness, etc.).

Americas

Respiratory Equipment Fit Test

S3AM-123-FM1

Date of Testing:	**Respirator Type(s):**
Employee Name:	**Respirator Model & Size:**
Method & Testing Agent:	
Corrective lenses needed: ☐ **Yes** ☐ **No**	
Is the employee medically qualified to wear a respirator? ☐ **Yes** ☐ **No** **Date of last medical exam (if applicable):**	
Is the employee trained on the fundamental principles of respiratory protection, use, selection, inspection, cleaning, maintenance, and storage of equipment? ☐ **Yes** ☐ **No**	

Test Exercise		**Test Exercise**	
Sensitivity Check	☐ **Pass** ☐ **Fail**	Normal Breathing	☐ **Pass** ☐ **Fail**
Deep Breathing	☐ **Pass** ☐ **Fail**	Turning Head (side to side)	☐ **Pass** ☐ **Fail**
Moving Head (up/down)	☐ **Pass** ☐ **Fail**	Rainbow Passage*	☐ **Pass** ☐ **Fail**
Bending Over	☐ **Pass** ☐ **Fail**	Normal Breathing	☐ **Pass** ☐ **Fail**

Successful Respirator Fit Determined: ☐ **Yes** ☐ **No**

I certify that I have been tested with the respirator(s) listed above. I have also had the opportunity to ask questions and those questions have been answered to my satisfaction. I also understand that the above fit test is voided if respirator limitations are not followed or the respirator is not worn or if conditions (e.g., facial hair) prevent a good face seal.

Employee Signature:	Date:
Signature of Tester:	Date:

***Rainbow Passage.** "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."*

Americas

Voluntary Use of Respirators

S3AM-123-FM2

Instructions: An employee that is opting to use a respirator for non-overexposure conditions shall read this page, and then sign on the bottom of the page. A copy shall be maintained in the employee's training file.

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee.

Sometimes employees may wear respirators to avoid exposures to hazards, even if the amount of the hazardous substance does not exceed the limits set by regulatory standards. Voluntary masks may be used for nuisance dust, pollen, and sometimes noxious odors. If your employer provides respirators for your own voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not pose a hazard.

1. Read and follow all instructions provided by the manufacture on use, maintenance, cleaning, and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. A label or statement of certification should appear on the respirator or respirator packaging; it will tell you what the respirator is designed for and how it will protect you. “The National Institute for Occupational Safety and Health (NIOSH) certifies respirators in the U.S and Canada.”
3. Do not wear your respirator into atmospheres containing contaminants against which your respirator is not designed to protect. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, fumes, smoke, or very small solid particles.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.
5. If you have any health conditions (e.g., asthma; high blood pressure; emphysema; heart disease, etc.) that could be aggravated by using a respirator, you should check with your doctor before using one.

I have read and understand this information: Date: _____

Employee’s Name (Please Print):

Employee’s Signature:

Americas

Respiratory Equipment Inspection

S3AM-123-FM3

Date:		**Inspected by:**		
Serial #:				
Examine Face Piece for:		N/A	Pass	Fail
Excessive dirt		☐	☐	☐
Cracks, tears, holes, or distortion from improper storage		☐	☐	☐
Inflexibility (stretch and massage to restore flexibility)		☐	☐	☐
Cracked or badly scratched lenses in full facepieces		☐	☐	☐
Incorrectly mounted full facepiece lens or broken or missing mounting clips		☐	☐	☐
Lens sealed properly in receptacle, retaining clamp secured		☐	☐	☐
Cracked / broken air-purifying element holder(s), badly worn threads, missing gasket(s)		☐	☐	☐
Examine the Head Straps or Head Harness for:				
Breaks		☐	☐	☐
Loss of elasticity		☐	☐	☐
Broken or malfunctioning buckles and attachments		☐	☐	☐
Excessively worn serrations on head harness that might permit slippage (full facepieces only)		☐	☐	☐
Tears in headband at cradle attachment		☐	☐	☐
Examine the Inhalation and Exhalation Valves for:				
Foreign material, such as detergent residue, dust particles, or human hair under the valve seat		☐	☐	☐
Cracks, tears, or distortion in the valve material		☐	☐	☐
Proper insertion of the valve body in the facepiece		☐	☐	☐
Cracks, breaks, or chips in the valve body, particularly in the sealing surface		☐	☐	☐
Proper installation of the valve in the valve body		☐	☐	☐
Missing or defective valve cover		☐	☐	☐
Examine the Air Purifying Elements for:				
Incorrect cartridge, canister, or filter for the hazard		☐	☐	☐
Incorrect installation, loose connection, missing / worn gaskets, cross-threading in the holder		☐	☐	☐
Cracks or dents on the outside case of the filter, cartridges or canister, indicated by the absence of sealing material, tape, foil, etc. over the inlet		☐	☐	☐
Expired shelf life date on cartridge or canister		☐	☐	☐
Examine PAPR, SCBA and Escape Bottles for:				
Damage or wear evident on the regulator or hoses				
Cylinder pitted, dented or otherwise damaged				
Cylinder / tank certified to the standard of applicable jurisdiction, hydrostatic test current				
Defects Noted:				
Unit Deemed Suitable for Use		☐ Yes	☐ No	

Americas

Signs, Signals & Barricades

S3AM-346-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content where signs, signals, tags, and/or barricades are used as methods of incident prevention.

1.2 The purpose of this purpose is to identify those situations where the application of signs, signals, tags, and/or barricades may assist in the control of accidents on AECOM project sites.

2.0 Terms and Definitions

2.1 **Barricade** – An obstruction to prevent the passage of persons or vehicles.

2.2 **Signs** – A display warning of hazards, temporarily and permanently affixed or placed, at locations where said hazards exist.

2.3 **Signals** – Moving signs, provided by workers such as flaggers, or by devices, such as flashing lights, to warn of possible or existing hazards.

2.4 **Tags** – Temporary signs, usually attached to a piece of equipment or part of a structure, to warn of existing or immediate hazards.

3.0 References

3.1 S3AM-208-PR1 Personal Protective Equipment

3.2 S3AM-306-PR1 Highway & Road Work

4.0 Procedure

4.1 Implementation of this standard is the responsibility of the manager directing activities of the facility, site or project location.

4.2 Signs, signals and barricades shall be placed and maintained at appropriate locations so they are visible, can be understood, and be appropriately observed.

4.3 Employees shall be trained to properly interpret signs, signals or barricades present in their workplace.

4.4 Types of Signs and Tags

4.4.1 Danger Signs

- Danger signs will be used where an immediate hazard exists.
- Danger signs will have red as the predominant color for the upper panel, white lettering spelling "Danger" in the upper panel, black outline on the border, and a white lower panel for additional sign wording (in black).

4.4.2 Caution Signs

- Caution signs will be used only to warn against potential hazards or to caution against unsafe practices.
- Caution signs will have yellow as the predominant color, black upper panel and borders, yellow lettering spelling "Caution" on the black upper panel, and the lower yellow panel for additional sign wording. Black lettering will be used for additional wording.

4.4.3 Exit Signs

- Exit signs, when required, will be lettered in legible red letters, not less than 6 inches (15.25 centimeters [cm]) high, on a white field. The principal width of the lettering will be at least three-quarters of an inch (1.9 cm) in width. Exit signs must also meet all state and local requirements.

4.4.4 Safety Instruction Sign

- Safety instruction signs, when used, will be white with a green upper panel with white letters to convey the principal message. Any additional wording on the sign will be black letters on the white background.

4.4.5 Directional Signs

- Directional signs other than automotive warning and temporary traffic control signs will be white with a black panel and a white directional symbol. Any additional wording on the sign will be black letters on the white background.

4.4.6 Traffic Signs

- Construction areas will be posted with legible traffic signs at points of hazards.
- Traffic control signs or devices used for protection of construction personnel will conform to the Manual on Uniform Traffic Control Devices (MUTCD). Refer to *S3AM-306-PR1 Highway & Road Work*, for additional information.

4.4.7 Accident Prevention Tags

- Accident prevention tags will be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They will not be used in place of, or as a substitute for, accident prevention signs.

4.4.8 Additional Rules

- Signs and tags will be visible at all times when work is being performed, and will be removed or covered promptly when the hazards no longer exist.

4.5 Signaling

4.5.1 When operations are such that signs and barricades do not provide the necessary protection on or adjacent to a highway or street, flaggers or other appropriate traffic controls will be provided.

4.5.2 Signaling directions by flaggers will conform to applicable regulatory requirements.

4.5.3 Hand signaling by flaggers will be by use of sign paddles or red flags at least 24 inches square. Signs are preferred over flags because they give more positive guidance to the motorist. In periods of darkness, red or white flashing lights on the sign paddles can be used to increase conspicuity. When flashing lights are used, the flash rate will be no less than 50 and no more than 60 flashes per minute.

4.5.4 Flaggers will be provided with and will wear apparel in accordance with *S3AM-208-PR1 Personal Protective Equipment*.

4.6 Barricades

4.6.1 Barricades must conform to applicable regulatory requirements.

4.6.2 If cones or tubular markers are used, they must be predominantly orange and made of a material that can be struck without causing damage to the impacting vehicle. Cones and tubular markers must be a minimum of 28 inches (71 centimeters) in height for all road applications.

4.6.3 Develop a barricade plan if a site or facility will routinely use barricades.

5.0 Records

The following documentation must be maintained in the project file:

5.1 Barricade plans, as applicable.

6.0 Attachments

6.1 None

Americas

Underground Utilities

S3AM-331-PR1

1.0 Purpose and Scope

1.1 Provides procedures designed to help prevent injuries to personnel working on the location and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with encountering underground utilities, subsurface installations, and potential overhead hazards.

1.2 Provides the minimum requirements to be followed for underground work (e.g., excavations, drilling, boring, and probing work) to ensure that underground installations, and subsurface structures, are identified properly before work commences.

1.3 This procedure applies to all Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling and communications, etc.

2.2 **Clearance** – includes the following:

- The positive locating of underground utilities or subsurface installations in or near the work area.
- A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

2.3 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.4 **Hand Clearance / Tolerance Zone –** The area on either side of the locate marks of a utility that shall be maintained in order to expose the utility through the use of non-destructive ground disturbance techniques acceptable to the owner of the buried utility and applicable jurisdictional requirements. Visual exposure is required before mechanical excavation equipment may be used.

2.5 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench or depression in an earth surface formed by earth removal.

2.6 **Non-Destructive Ground Disturbance Technique –** A safe and acceptable excavation method that is used to visually expose an underground utility without causing damage. Non-destructive ground disturbance techniques may include, but are not limited to:

- Hand digging.
- Use of non-conductive tools.
- Hydro-vacuum.

2.7 **Subsurface Installation –** Examples: Subterranean tunnels, underground parking garages and other structures beneath the surface.

2.8 **Utility Strikes –** Unplanned contact with utilities resulting in damage to the utility or its protective coating.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-303-PR1 Excavation

3.3 S3AM-321-PR1 Drilling, Boring & Direct-Push Probing

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Administer this procedure and the development of the SH&E Plan.
- Confirm the appropriate equipment and materials are available to conduct the underground utility and/or subsurface installation clearance.
- Confirm all employees involved and affected by the task review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing
- Authorize work to proceed using the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist*.
- Confirm that employees conducting underground utilities and subsurface clearance processes possess all required training, registrations or certifications.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

4.1.2 **Safety, Health & Environment (SH&E) Manager**

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the SH&E Plan to confirm compliance with jurisdictional regulations. Provide technical guidance as needed when a variance is pursued related to this procedure.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g. ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training*.
- Review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and/or repairs.

4.2 Training

4.2.1 All on-site employees involved with the underground utility and subsurface identification and associated clearance process shall be trained, at a minimum, in these procedures.

4.2.2 Employees shall complete all required training associated with their tasks in accordance with the SH&E Training Matrix and any training assessments developed at the business group.

- Refer to *S3AM-003-PR1 SH&E Training.*
- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.

4.2.3 As applicable, employees shall receive client-required training.

4.3 Planning

4.3.1 Health and Safety Plan – At a minimum, a SH&E Plan and task hazard assessments (THAs) shall be prepared prior to any underground utilities and subsurface installations clearance activities.

- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- Employees shall comply with all SH&E Plan requirements.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 *S3AM-331-ATT2 Underground Utilities & Subsurface Installation Clearance Flow Chart* provides a summary of the key requirements addressed in this procedure.

4.3.3 Underground utilities and subsurface installations shall be investigated as being present, including the following, but not limited to:

- Steam, gas and electric.
- Sewer and water.
- Subterranean tunnels.
- Fibre optics (note: routine geophysical surveys will not identify fibre optic cables).
- Traffic control cables.

4.3.4 Location of underground utilities and subsurface installations will be confirmed by cross-referencing available information:

- Maps, as-built drawings and issued for construction (IFC) drawings.
- Plot plans, permits, crossing/encroachment agreements.
- One-Call information, locator and provided surveys.
- Private utility information, locator and provided surveys (e.g. ground penetrating radar (GPR), electromagnetic, etc.).
- Owner supplied documentation.
- Site walks.

4.3.5 As applicable, emergency shut-off locations of utilities shall be verified before work activities commence.

4.3.6 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the minimum search zone dimensions and appropriate clearance distances.

4.3.7 As necessary and if possible, adjust locations of excavations or intrusive subsurface work away from subsurface utilities and installations

4.3.8 Prior to any excavation or intrusive subsurface work, the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* shall be completed. The form shall be reviewed and signed by the Manager.

- If the answer to any question in Part 1 of the checklist is “No” or “N/A”, no ground disturbance may take place without review by the Manager, in consultation with SH&E Manager, of the circumstances related to the particular item. The Manager shall initial beside each “No” or “N/A” item to indicate review and authorization.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, utility company, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 All access agreements will be obtained and adhered to.

4.5 Locating Underground Utilities and Subsurface Installations

4.5.1 Utilize the appropriate call/click-before-you-dig provider. Refer to *S3AM-331-ATT1 One-Call System*.

4.5.2 Federal/State/Provincial/Territorial and other “One Call” providers shall be contacted at least two working days and no more than ten working days prior to commencing the ground disturbance. Jurisdictional requirements shall be consulted to verify the appropriate advance notice. (e.g. 24 hours, two full working days, three to ten business days, etc.).

4.5.3 If the location of proposed excavation or intrusive subsurface work cannot be clearly and adequately identified, the route and/or area of the proposed ground disturbance shall be identified using white flags, paint or stakes prior to the arrival of the locator. Consult jurisdictional requirements as white-lining may be a mandatory requirement on all ground disturbances.

4.5.4 One Call providers shall appropriately identify and mark the subsurface utilities or installations, or otherwise provide written notification they do not have any facilities near the proposed subsurface/intrusive locations.

4.5.5 Confirm all circuits were on during subsurface checks if the checks were for identifying energized lines (e.g. circuits on timers or light sensing switches).

4.5.6 Areas that have a high density of sub-surface facilities may require a secondary locate by another independent locator to verify locations identified by the first locator.

4.6 Private Utility Locating

4.6.1 One Call services may not be available in various non-urban locations. Private utility locating companies shall be utilized to identify and located any underground utilities or subsurface installations.

4.6.2 Be aware urban areas (e.g. city or town) may have subsurface installations (e.g. underground garages) and utilities (e.g. public water, sewer, and gas pipelines) that are not covered by one-call systems.

- These subsurface installations and utilities require additional investigation and diligence beyond the one-call system.
- Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.

4.6.3 In urban areas, private utility locating companies shall be called to identify and locate, through geophysical surveys and other means, the presence of private utilities installed by the property owner (e.g. irrigation systems) and to verify the presence of public utilities on the properties.

- Hand clearance / tolerance zones shall be observed in urban areas and utilities exposed through the use of non-destructive techniques in accordance with requirements of the applicable jurisdiction and utility owner.

4.6.4 Observance of hand clearance / tolerance zones and utility exposure using non-destructive techniques is also recommended for non-urban areas and may be required by the applicable jurisdiction.

4.6.5 Warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill may be evidence of the presence of subsurface installations and utilities.

4.7 Surface Markings

4.7.1 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines from the One-Call System (refer to S3AM-331-ATT1), guidance contained in this procedure or as contract-specified.

4.7.2 Color-coded surface marks (paints or similar coatings) shall be used to indicate the type, location, and route of buried installations. Additionally, to increase visibility, color-coded vertical markers (temporary stakes or flags) shall supplement surface marks.

4.7.3 All marks and markers shall indicate the name, initials, or logo of the company that owns or operates the installation and the width of the installation if it is greater than 2 inches.

4.7.4 If the surface over the buried installation is to be removed, supplemental offset marking shall be used. Offset markings shall be on a uniform alignment and shall clearly indicate that the actual installation is a specific distance away.

4.7.5 Locate marks shall be re-verified as per jurisdictional requirements or no later than 14 days after the previous locate was completed, whichever interval is shorter. These locate time intervals shall be maintained for the duration of the ground disturbance.

- If the work is interrupted during the determined lifespan or work does not commence during the applicable lifespan, a new locate shall be performed.
- Jurisdictional provisions may allow for an extension to the lifespan of the locate marks, however certain conditions may need to be met. (e.g. activities uninterrupted)
- If locate marks are moved or destroyed the location of the buried facilities shall be re-established.

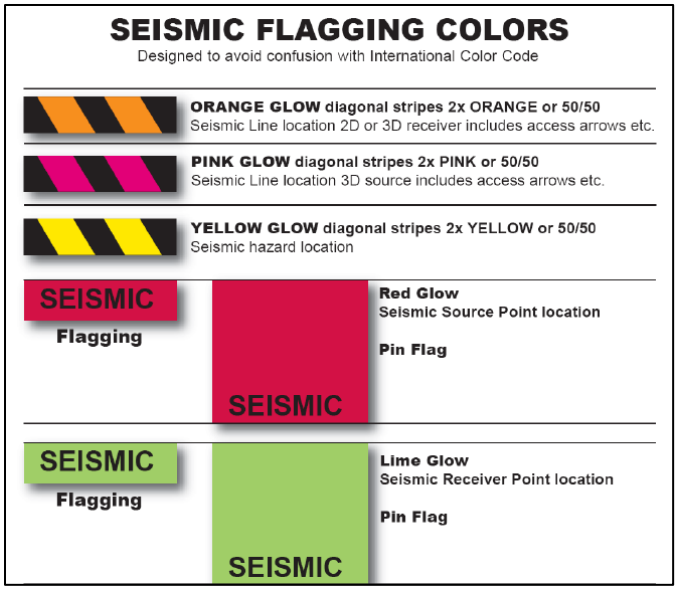
4.8 Uniform Color Coding

4.8.1 The colors and corresponding installation type are as follows unless otherwise contract-specified:

AMERICAN PUBLIC WORKS ASSOCIATION – APWA
Color Coding for Marking of Buried Facilities

White	Proposed Ground Disturbance Area
Pink	Temporary Survey Markings
Red	Electric Power Lines, Cables, Conduit and Lighting Cables
Yellow	Gas, Oil, Steam, Petroleum Lines or Gaseous Materials
Orange	Conduit, Cable, Communication, Alarm or Signal Lines
Blue	Potable Water
Green	Sewer, Storm Sewer and Drain Lines
Purple	Reclaimed Water, Irrigation and Slurry Lines (non-potable)

Canadian Association of Geophysical Contractors



4.9 Identification and Mapping of Utility and Subsurface Structures

4.9.1 The locations of subsurface utilities and subsurface installations shall be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.*

4.9.2 Documentation of utility and subsurface installation identification (calling one call, responses from utilities) along with the scaled site plan shall be available on the worksite at all times of intrusive activities.

4.10 Site Walk

4.10.1 A site walk shall be conducted by the AECOM Manager and any other appropriate personnel with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities, overhead obstructions, and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.

- Walk the area at least 50 feet (15.2 meters) from perimeter of the site to observe physical hazards.
- Walk the area of at least 50 feet (15.2 meters) radius from each proposed subsurface intrusion location.
- If possible, particularly at urban and industrial sites, the client/property owner or an individual knowledgeable about the site and site utilities will attend the site walk.
- Add discovered items/issues to map for use in location confirmation.

4.10.2 The Site Walk further supplements the Identification and Mapping of Utility and Subsurface Structures procedure. Site Walks should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures as visual verification of the hazards. Examples include:

- Proposed location(s) does not lie on a line connecting two similar manhole covers (e.g. sanitary sewer or storm drain).
- Proposed subsurface location(s) has not subsided, been excavated and patched, nor gives the appearance it may be covering a former trench (e.g. linear cracks, sagging curbs, linear re-pavements, etc.).
- Proposed subsurface location(s) does not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas.

4.11 Proposed Subsurface Investigation Locations

4.11.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.

4.11.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

4.12 Utility Clearance Investigation Location Confirmation

4.12.1 As applicable, all client on-site safety procedures shall be understood and adhered to.

4.12.2 Hand exposure or non-destructive ground disturbance techniques to expose an underground utility or subsurface installation are necessary to accurately determine size, location and alignment prior to mechanical excavation or intrusive subsurface work in the vicinity of that utility or installation.

4.12.3 Non-destructive ground disturbance techniques shall be acceptable to the owner of the buried utility (i.e. hydro-vacuum temperature or pressure).

4.12.4 Hydro-vacuum or air-knife require proper grounding equipment at sites where the subsurface may contain flammable gases, liquids, or vapors

4.12.5 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the distance of the hand exposure zone, and what requirements, when met, may allow mechanical excavation within these zones.

4.12.6 At a minimum, all underground utilities and subsurface installations within a 5 feet (1.5 meter) radius of the work site shall be identified and physically located (seen) before use of mechanical excavation equipment is permitted. Jurisdictional, client, land owner and utility owner requirements shall be consulted as the required hand exposure radius may be larger.

4.12.7 In urban areas, proposed subsurface locations will be cleared by hand / non-destructive technique to 5 feet (1.5 meters) (soil borings and wells) or 12 inches (30 centimeters) (soil gas sampling probes) using non-mechanical methods.

- In non-urban areas, clearing by hand / non-destructive technique should be conducted if possible and shall be conducted as required by the given jurisdiction.
- Hand / non-destructive technique clearance should be extended if locations of deep utilities and structures are not known.
- Hand exposure or non-destructive ground disturbance techniques should extend a minimum of 24 inches (60 centimeters) below the intended ground disturbance depth to minimize the hazard of mechanical equipment contact with any utility or installation.

4.12.8 Mechanical equipment and attachment dimensions shall be considered when establishing the zone in which all underground utilities and subsurface installations are physically located (seen) prior to the use of that equipment. The radius may require expanding to maintain safe distances when using large equipment.

4.13 Utility Strikes

4.13.1 Utility strikes shall be reported in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*.

4.13.2 All damaged utilities shall be repaired by a qualified and/or licensed professional.

5.0 Records

5.1 Retain completed *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* and documents related the clearance process (e.g. Utility Owner communication, etc.) in the site or project files.

5.2 Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

6.0 Attachments

6.1 S3AM-331-ATT1 One-Call System

6.2 S3AM-331-ATT2 Underground Utilities & Subsurface Installation Flow Chart

6.3 S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist

Americas

One-Call System

S3AM-331-ATT1

1.0 What Is It?

1.1 One-call systems are established across the Americas to provide one telephone number for excavating contractors and the general public to call for notification of their intent to use equipment for excavating, tunneling, demolition, or any other similar work. This one-call system provides the participating members an opportunity to identify and locate their underground facilities.

1.2 As described on their web site (http://www.call811.com), Common Ground Alliance (CGA) was "created specifically to work with all industry stakeholders in an effort to prevent damage to underground utility infrastructure and ensure public safety and environmental protection." CGA also serves as an organization to continuously update best practices amongst the growing underground industry. The CGA web site provides current one-call information for all states and provinces.

2.0 Why Is It Needed?

2.1 Damage to underground facilities increased considerably following the building boom of the 1950s, 1960s, and early 1970s when the trend was to go underground with utilities. Thousands of miles of underground facilities are vulnerable to excavating machines such as backhoes, and the resulting damage can interrupt utility service and threaten life, health, and property.

3.0 How to Get It

3.1 In the United States 811 is the Federally-mandated national "Call Before Your Dig" number that connects directly to the local one-call center. Each state has different rules and regulations governing digging, some stricter than others. The CGA web site provides current contact information to find state-specific information as well as links to submit an online digging request where available. Canadian one-call numbers vary by jurisdiction. One-call services are not available in Canada's Atlantic provinces (New Brunswick, Newfoundland, Nova Scotia) or in the three Northern Territories (Nunavut, Northwest Territories, Yukon).

4.0 Disclaimer

4.1 The purpose of this directory is to illustrate the extent of one-call service available. Some jurisdictions have a list of "Tier 1" subscriber utilities notified by 811, and a "Tier 2" list that the excavator/contractor is responsible for contacting directly. Users shall verify information is current including the extent and limit of service from local sources.

Province/State	One-Call Agency		Number
Canada	www.clickbeforeyoudig.com		
Alberta	Alberta One Call	www.albertaonecall.com	1.800.242.3447
British Columbia	BC One Call	www.bconecall.bc.ca	1.800.474.6886
Manitoba	Click Before You Dig	www.clickbeforeyoudigmb.com	Various – see website
Ontario	Ontario One Call	www.on1call.com	1.800.400.2255
Québec	Info Excavation	www.info-ex.com	1.800.663.9228
Saskatchewan	Sask 1st Call	www.sask1stcall.com	1.866.828.4888

United States	www.call811.com	811
Alabama	Alabama 811	1.800.292.8525
Alaska	Alaska Digline, Inc.	1.800.478.3121
Arizona	Arizona 811	1.800.782.5348
Arkansas	Arkansas One Call	1.800.482.8998
California	(North & Central) USA North 811	1.800.227.2600
	(South) Dig Alert	1.800.227.2600
Colorado	Colorado 811	1.800.922.1987
Connecticut	Call Before You Dig	1.800.922.4455
Delaware	Miss Utility of Delmarva	1.800.282.8555
District of Columbia	District One Call	1.202.265.7177
Florida	Sunshine 811	1.800.432.4770
Georgia	Georgia 811	1.800.282.7411
Hawaii	Hawaii One Call	1.866.423.7287
Idaho	Dig Line, Inc.	1.800.342.1585
	(Bonner/Boundary) Pass Word	1.800.626.4950
	(Kootenai County) Pass Word	1.800.428.4950
	(Shoshone-Benewah) Pass Word	1.800.398.3285
Illinois	(Chicago) Digger -Chicago Utility Alert Network	312.744.7000
	(Outside of Chicago) JULIE	1.800.892.0123
Indiana	Indiana 811	1.800.382.5544
Iowa	Iowa One Call	1.800.292.8989
Kansas	Kansas 811	1.800.344.7233
Kentucky	Kentucky 811	1.800.752.6007
Louisiana	LA One Call	1.800.272.3020
Maine	Dig Safe	1.888.344.7233
Maryland	(West of Chesapeake Bay) Miss Utility of Maryland	1.800.257.7777
	(East of Chesapeake Bay) Miss Utility of Delmarva	1.800.282.8555
Massachusetts	Dig Safe System, Inc.	1.888.344.7233
Michigan	Miss Dig	1.800.482.7171
Minnesota	Gopher State One Call	1.800.252.1166
Mississippi	Mississippi 811	1.800.227.6477

Missouri	Missouri One Call System	1.800.344.7483
Montana	Montana 811	1.800.424.5555
	(Flathead and Lincoln Counties) Montana One Call Center	1.800.551.8344
Nebraska	Nebraska 811	1.800.331.5666
Nevada	USA North 811	1.800.227.2600
New Hampshire	Dig Safe System, Inc.	1.888.344.7233
New Jersey	New Jersey One Call	1.800.272.1000
New Mexico	New Mexico 811	1.800.321.2537
New York	(North of 5 Boroughs) Dig Safely New York	1.800.962.7962
	(5 Boroughs and Long Island) New York 811, Inc.	1.800.272.4480
North Carolina	North Carolina 811	1.800.632.4949
North Dakota	North Dakota One Call	1.800.795.0555
Ohio	Ohio Utilities Protection Service	1.800.362.2764
Oklahoma	Call Okie	1.800.522.6543
Oregon	Oregon Utilities Notification Center	1.800.332.2344
Pennsylvania	Pennsylvania One Call System, Inc.	1.800.242.1776
Puerto Rico	Puerto Rico Public Service Commission 811	
Rhode Island	Dig Safe System, Inc.	1.888.344.7233
South Carolina	South Carolina 811	1.888.721.7877
South Dakota	South Dakota One Call	1.800.781.7474
Tennessee	Tennessee 811	1.800.351.1111
Texas	Texas 811	1.800.545.6005
	Lone Star 811	1.800.669.8344
Utah	Blue Stakes of Utah	1.800.662.4111
Vermont	Dig Safe System, Inc.	1.888.344.7233
Virginia	Virginia 811	1.800.552.7001
Washington	Utility Notification Center	1.800.424.5555
West Virginia	WV 811	1.800.245.4848
Wisconsin	Diggers Hotline	1.800.242.8511
Wyoming	One-Call Of Wyoming	1.800.849.2476

Americas

Underground Utilities & Subsurface Installation Clearance Flow Chart

S3AM-331-PR1

Before Any Underground Utilities and Subsurface Installation Clearance

PERMITS AND ACCESS AGREEMENTS

- **Government and Utility/Infrastructure Permits**
- **Client permits and procedures**
- **Access Agreements**

KEY POINT: Obtain all permits and sign Access Agreement (if required)

↓

GENERAL HEALTH and SAFETY

KEY POINT: Prepare the SH&E Plan and a Task Hazard Assessment (THA).

↓

LOCATING UNDERGROUND UTILITIES & SUBSURFACE INSTALLATIONS

KEY POINT: Utilize the appropriate call/click-before-you-dig provider and as necessary, engage private locators. Refer to *S3AM-331-ATT1 One-Call System*.

↓

IDENTIFICATION & MAPPING OF UTILITY and SUBSURFACE STRUCTURES

KEY POINT: Generate a comprehensive site map illustrating known locations of overhead/subsurface utilities, subsurface structures, and proposed boring locations.
Complete *S3AM-331-FM1 Pre-Drilling, Boring, & Direct-Push Checklist*.

↓

SITE WALK

KEY POINT: Perform a site walk utilizing site map and 360° view to verify known conditions and identify potential issues. Add discovered items/issues to map for use in location confirmation.

↓

PROPOSED SUBSURFACE INVESTIGATION LOCATIONS

KEY POINT: Confirm that locations meet the minimum required set-back distances.

↓

UTILITY CLEARANCE INVESTIGATION LOCATION CONFIRMATION

KEY POINT: Locations shall be hand-cleared using non-destructive ground disturbance techniques and visually verified.

Americas

Underground Utilities & Subsurface Installation Clearance Checklist

S3AM-331-FM1

Location:	**Project #:**	**Date & Time:**
Manager:	**Contractor (if applicable):**	**Weather:**
Client:	**Inspector:**	
Notes:		

Part 1

Part 1 and Part 2 shall be completed prior to any intrusive subsurface work. DO NOT DISTURB GROUND if a "No" or "N/A" answer to any of the Part 1 questions has not been initialed as authorized by the AECOM Manager.

Any variance from these procedures requires approval of the Vice President of the applicable business group.

		Yes	No	N/A
I.	**Permits and Access Agreements**			
1.	Have all appropriate permits and agreements been identified and obtained (e.g. client, drilling, encroachment, working near railroads, etc.)?	☐	☐	☐
2.	Have all client requirements been identified and obtained?	☐	☐	☐
3.	If working off-site is (are) site access agreement(s) executed?	☐	☐	☐
II.	**General Health and Safety**			
1.	Has a Health and Safety Plan (HASP) been prepared for AECOM employees?	☐	☐	☐
2.	Do on-site personnel have required-level PPE?	☐	☐	☐
3.	Do on-site personnel have required-level of training?	☐	☐	☐
4.	Is appropriate monitoring equipment as specified in HASP/THAs available at each clearance location?	☐	☐	☐
5.	Has the field screening equipment been calibrated as required by the HASP?	☐	☐	☐
6.	Are calibration gases available at the site?	☐	☐	☐
III.	**Identification and Mapping of Utility and Subsurface Structures**			
1.	Is a Site Plan showing proposed subsurface locations and utility locations attached to this check list?	☐	☐	☐
2.	Have above/below ground utilities & subsurface installations been investigated (Part 2 of this form)?	☐	☐	☐
3.	Have all Federal/State/Provincial/Territorial and other "One Call" providers marked their facilities or otherwise notified they do not have any facilities near the proposed subsurface/intrusive locations?	☐	☐	☐
4.	Have Federal/State/Provincial/Territorial or other "One Call" providers identified what utilities and underground structures are *not* included in their provider system (e.g. underground structures)?	☐	☐	☐
5.	As noted in the exception at the bottom of Section VI of this checklist, has a utility locating contractor performed geophysical and/or other surveys of the proposed subsurface/intrusive locations?	☐	☐	☐

Part 1 and Part 2 shall be completed prior to any intrusive subsurface work. DO NOT DISTURB GROUND if a "No" or "N/A" answer to any of the Part 1 questions has not been initialed as authorized by the AECOM Manager.

Any variance from these procedures requires approval of the Vice President of the applicable business group.

	Yes	No	N/A
6. Visual verification that each of the proposed locations does not lie on a line connecting two similar manhole covers (e.g. sanitary sewer or storm drain)?	☐	☐	☐
7. Visual verification that the ground in the vicinity of each of the proposed subsurface locations has not subsided, been excavated and patched, give the appearance it may be covering a former trench (e.g. linear cracks, sagging curbs, linear re-pavements, etc.) and does not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas?	☐	☐	☐
IV. Site Walk			
1. Has a site walk been performed that includes the following:	☐	☐	☐
a. Reviewing all planned intrusive locations?	☐	☐	☐
b. Adjusting locations away from subsurface utilities and installations?	☐	☐	☐
c. Determining the appropriate utility clearance activities for each location?	☐	☐	☐
d. Determining the presence and location of overhead utilities and obstructions?	☐	☐	☐
e. Walk around perimeter of the site to observe physical hazards?	☐	☐	☐
f. Includes 50 feet (15.2 meters) from perimeter of the site to observe physical hazards and 50 feet (15.2 meters) radius from each proposed subsurface location?	☐	☐	☐
V. Proposed Subsurface Investigation Locations*			
1. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any identified subsurface utility?	☐	☐	☐
2. Are all of the proposed subsurface locations at least 7 feet (2.1 meters) from the pad surrounding any underground storage tanks (USTs) shown on the Site Plan?	☐	☐	☐
3. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities shown on the Public Right-of-Way street improvements?	☐	☐	☐
** These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.*			
VI. Utility Clearance Investigation Location Confirmation*			
1. Have the hand clearance / tolerance zones of subsurface locations been observed and utilities exposed through the use of non-destructive techniques as follows? Hand / non-destructive technique clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas hand clearing should be conducted if possible and according to local requirements.	☐	☐	☐
a. For soil borings/monitoring wells; excavated to a minimum of 5 feet (1.5 meters) below ground surface using non-mechanical methods?	☐	☐	☐
b. For soil gas sampling; excavated to 2 foot (0.6 meter) below grade or below the bottom of a concrete floor prior to the installation of soil gas sample probe points?	☐	☐	☐

* *Exceptions to requirements of the utility clearance process, as permitted by the applicable jurisdiction, include the following:*

- *Sites where extensive utility mapping (e.g. geophysical survey) has been completed and/or where extensive activities have already been performed.*
- *Locations where facility layout is well documented and understood.*
- *Sites or portions of large sites where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.*

Part 1 and Part 2 shall be completed prior to any intrusive subsurface work. DO NOT DISTURB GROUND if a "No" or "N/A" answer to any of the Part 1 questions has not been initialed as authorized by the AECOM Manager. *Any variance from these procedures requires approval of the Vice President of the applicable business group.*	**Yes**	**No**	**N/A**
Comments:			
Documentation supplied by one-call or private utility and installation locators, including email or written field confirmation / maps of mark-out requests and status shall accompany this form. If this form is supporting multiple ground disturbance activities, a copy of this completed form should be provided to each activity.			

Part 2

Public Utility Locate (OneCall)				Prior Locate Ticket #	
Date Called:		Called By:		Valid Until:	
Ticket Number:		Area Requested To Be Cleared:			

Private Utility Locate		Prior Locate Ticket #	
Company Performing Locate:		Date Completed:	
Area(s) Requested To Be Cleared (including distance around marked locations):			
Method(s) Used (e.g., GPR, EM):			
Confirm Area(s) Cleared:			

OneCall Utilities			**Field Observation**
Utility	**Notified by**	**Comments**	**Marked** (mains & services)
Electric (Red)	☐ OneCall ☐ Other		☐ Yes ☐ No ☐ Above
Gas/Petroleum Pipeline (Yellow)	☐ OneCall ☐ Other		☐ Yes ☐ No
Sewer/Drainage (Green)	☐ OneCall ☐ Other		☐ Yes ☐ No
Water (Blue)	☐ OneCall ☐ Other		☐ Yes ☐ No
Communications (Orange)	☐ OneCall ☐ Other		☐ Yes ☐ No ☐ Above
Other	☐ OneCall ☐ Other		☐ Yes ☐ No ☐ Above
Were all circuits on during subsurface checks if the checks were for identifying energized lines (e.g., circuits on timers or light sensing switches)?			☐ Yes ☐ No ☐ N/A

Utilities Not Identified By OneCall (Includes both Public and Private along with Regional and Site Utilities)			**Field Observation**
Utility (Colors may vary)	**Owner / Contact / Phone #**	**Notified**	**Marked**
Communications: (Orange) TV, computer, phone, cell towers, site communication, cameras, security, etc.		☐Yes ☐No	☐ Yes ☐ No ☐ Above
Electricity: (Red) Mains / Supplies / Interior / Exterior (signs, fuel pumps, low voltage security perimeters, gates, property light posts, equipment, substations, etc.)		☐Yes ☐No	☐ Yes ☐ No ☐ Above
Gas: (Yellow) Mains / Supplies / Equipment / Pipelines (Natural, Process, Oil, Crude, Refined (Gas, Diesel, Jet), etc.)		☐Yes ☐No	☐ Yes ☐ No ☐ Above
Steam: (Yellow)		☐Yes ☐No	☐ Yes ☐ No ☐ Above

Structures: Possible horizontally installed facilities, vaults, basements, tunnels, sub-grade structures, foundations, overhead obstructions, etc.		☐Yes ☐No	☐ Yes ☐ No ☐ Above
UST Systems (Tanks / piping / electric)		☐Yes ☐No	☐ Yes ☐ No
Sewer: (Green) Sanitary, storm, combined, septic, drainage (parking, buildings, fields), irrigation		☐Yes ☐No	☐ Yes ☐ No
Water: (Blue) Process, Plant, potable, well, cooling, return/makeup, fire, sprinkler, landscape irrigation, reclaim (Purple) other		☐Yes ☐No	☐ Yes ☐ No ☐ Above
Other: Abandoned lines, invisible dog fences, shopping cart perimeter monitoring, traffic lights		☐Yes ☐No	☐ Yes ☐ No ☐ Above

Manager: _____ _____ _____

Print Sign Date

Americas

Wildlife, Plants & Insects

S3AM-313-PR1

1.0 Purpose and Scope

1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as “biological hazards”.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document’s content.

2.0 Terms and Definitions

2.1 **Field Work –** Any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance, biological surveys, and other work that meets the definition of field work.

2.2 **Poisonous** – Capable of harming or killing by or as if by poison; toxic or venomous.

2.3 **Phase I Environmental Site Assessment –** Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of Comprehensive Environmental Response, Compensation, and Liability Act defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called “All Appropriate Inquiry” or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.

2.4 **Phase II Environmental Site Assessment** – Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 References

3.1 RS2-001-PR1 Firearms Standard

3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3AM-008-PR1 Fitness for Duty

3.4 S3AM-113-PR1 Heat Stress

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for managing field work.

- Work with employees to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- Implement control measures at the location to reduce the potential for employees to be exposed to injuries and illnesses from biological hazards while working.
- If the exposures cannot be eliminated or managed with engineering controls, approve the use and cost of Personal Protective Equipment (PPE) and protective repellents and lotions and confirm that exposed employees have and use these products.

4.1.2 **SH&E Manager**

- Confirm training and guidance is provided to employees consistent with this procedure.
- During the performance of site visits, assess the precautions being taken against biological hazards for compliance with this procedure.
- Assist AECOM personnel in identifying hazards and selecting appropriate control measures.
- As applicable, review and approve relevant SH&E Plans for locations that have biological hazards.

4.1.3 **Employees**

- Participate in required training related this procedure.
- Participate in the development of THAs for the task, identify control measures to limit exposure and request PPE, repellents, and protective lotions identified by this procedure.
- Update the applicable THA when a new, unaccounted for biological hazard is identified. Employee shall stop work to identify appropriate elimination or control measures (and obtain any necessary guidance) before continuing work.
- Obtain approval from Managers and/or Supervisors to purchase selected PPE prior to purchasing.
- Implement the precautions appropriate to prevent exposure to the hazardous wildlife, insects and plants.
- Observe requirements for reporting (e.g. tick bites, skin irritations, etc.) as detailed within the procedure and attachments.

4.2 Training

4.2.1 Employees shall be trained to recognize organisms that represent a threat in the regions in which they work – experienced field staff shall provide on the job training to assist staff with hazard recognition.

4.2.2 Employees shall be properly trained to the anticipated tasks and the associated required PPE.

4.3 Overview

4.3.1 The procedures discussed below are detailed because these hazards have historically posed the most significant risk to AECOM employees. Note that this discussion is not a fully encompassing list of hazards. As part of the SH&E Plan and THA developed by the AECOM personnel, in accordance with *S3AM-209-PR1 Risk Assessment & Management*, additional consideration shall be given to other biological hazards.

4.3.2 Departments of Public Health local to the worksite, as well as the Centers for Disease Control (CDC) can serve as a resource for identifying biological hazards not discussed in this procedure.

4.3.3 If additional biological hazards are identified, employees should stop work and contact the SH&E Manager to discuss the hazards and identify effective control measures. Those control measures shall be implemented at the location prior to restarting work.

4.4 Employee Sensitivity

4.4.1 Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin; therefore, it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Employees should be aware that there are a large number of organisms capable of causing serious irritations and allergic reactions. Some reactions will only erupt if a secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can be severe scarring, blindness or even death.

4.4.2 Employees also need to consider whether they are sensitive to the use of insect repellents.

4.5 Planning and Hazard Assessment

4.5.1 AECOM personnel shall confirm that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this procedure are integrated into the THA planning process and conveyed to employees conducting the field work. This information shall be communicated in the location-specific SH&E plan, the THA, pre-project kickoff meetings, and tailgate meetings at the location.

4.5.2 It is important to note that the precautions to be taken by employees to decrease the risk of exposure to biological hazards can directly increase the risk of heat-related illness due to thermal stresses. Therefore, heat stress monitoring and precautions shall be included as a critical component of the task-specific THA in accordance with *S3AM-511-PR1 Heat Stress.*

4.5.3 During the preparation of the location-specific SH&E plan and task specific THA, Managers, Supervisors, and employees shall determine what biological hazards might be encountered during the task or operations and shall prescribe the precautions to be taken to reduce the potential for exposure and the severity of resulting illnesses. Consideration will be given to conditions such as weather, proximity to breeding areas, host animals, and published information discussing the presence of the hazards.

4.5.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40 degrees Fahrenheit (4.5 degrees Celsius) for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.

4.5.5 The hazard assessments shall also consider the additional hazards posed by vegetative clearing such as the increased risk of coming in contact with poison ivy, oak or sumac and hazards associated with the use of tools and equipment to remove vegetation.

4.5.6 Employees in the field where biological hazards exist shall not enter the hazard areas unless they are wearing the appropriate protective clothing, repellents, and barrier creams specified below. If the hazard is recognized in the field but was not adequately assessed during the THA, the field staff shall stop work and not proceed until the THA has been amended and approved and protective measures implemented.

4.5.7 Employees who have severe allergic reactions are strongly recommended to notify their Manager, field Supervisor and co-workers of the potential for a reaction and demonstrate what medication they might need, where they keep it and how it is administered.

4.5.8 A decision flow chart and table for determining the potential for biological hazards in the Americas has been provided in *S3AM-313-ATT1 Biological Hazard Assessment Flow Chart.*

4.5.9 Restrictions:

- No firearms or weapons are allowed to be used without express permission by the Region Executive and Chief Resilience Officer, refer to the *RS2-001-PR1 Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training.

- Staff with life-threatening reactions shall not undertake work in areas infested with the allergen (e.g., wasps, poison ivy), unless precautions are met which satisfy a medical practitioner's requirements. Refer to *S3AM-008-PR1 Fitness for Duty*.

4.5.10 Precautions

- Be aware of the potential irritants in your area and know how to recognize them.
- Modify activities to avoid encounters (diurnal rhythms, seasonal rhythms).
- Avoid wearing perfume and cologne and strong smelling deodorants, lotions, soaps, and shampoos.
- When working in areas where there may be small insects that "hitchhike" (e.g., ticks, spiders, scorpions), it is recommended that clothes are turned inside out and shaken at the end of day; do not wear same clothes two days in a row.
- Staff should always be aware of where they are placing their hands, or where they are sitting in order to avoid contact with potential toxins. Avoid reaching into areas where visibility is limited.

4.6 Wildlife Hazards (Wild Animals, Reptiles and Birds)

4.6.1 Employees shall not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling shall only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics:

- *S3AM-313-ATT13 Alligators*
- *S3AM-313-ATT9 Large Carnivores & Ungulates*
- *S3AM-313-ATT10 Bear Safety*
- *S3AM-313-ATT11 Small Mammals*
- *S3AM-313-ATT12 Snakes & Scorpions*

4.7 Ticks, Spiders and other Insects

4.7.1 Insects for which precautionary measures should be taken include but are not limited to: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, fire ants and European fire ants.

4.7.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. Epi-pens[1] shall be carried at all times in the field by employees who are aware that anaphylactic shock is a possibility for them AECOM highly recommends that employees with known allergies inform their co-workers of the allergy and the location of the medications they might carry for the allergy.

4.7.3 Habitat Avoidance, Elimination and/or Control

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the location of brush, high grass and foliage reduces the potential for exposure to biological hazards. Clearing will not eliminate the exposure to flying insects and there might be an increased exposure to ticks and spiders during the clearing process.
- Projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the Manager shall either request that the client eliminate vegetation, or request approval from the client to have vegetation clearing added to the scope of work.
    - It should be noted that vegetation clearance may unintentionally serve to spread noxious and poisonous plant materials around the site.

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[1] Epi-pens must be prescribed by a personal physician. Renew epi-pens on a regular schedule to ensure effectiveness and make sure your field companions know where it is and how to use it if you cannot self-administer the dose.

- As applicable, measures should be taken to prevent spread, such as but not limited to, confirming equipment and materials are not placed on affected areas, and equipment is decontaminated after use and before removal from site.

- When work shall be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile (less than half a kilometer) from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. Managers and client site managers should be contacted to determine whether water can be drained and the most appropriate method for draining containers, containment areas, and other objects of standing water.
- If water cannot be drained, products similar to Mosquito Dunks® can be placed in the water to control mosquitoes. Once wet, the Mosquito Dunks® kill the immature, aquatic stage of the mosquito. The active ingredient is a beneficial organism that is lethal to mosquito larvae, but harmless to fish, humans, and other animals. Mosquito Dunks® provide long-term protection for 30 days or more.

4.7.4 Ticks

- Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will attach themselves. The most serious concern is a possibility of contracting a disease.
- Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and, therefore, most related illnesses. The use of permethrin is strongly advised.
- The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in *S3AM-313-ATT2 Ticks* along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.
- When working in areas where ticks may occur, it is recommended that clothes are turned inside out and shaken at the end of day; do not wear the same clothes two days in a row.
- Employees should conduct a thorough full body tick check upon exiting the field. Shower within two hours of coming indoors to help wash away loose ticks. Clothes should be laundered in hot water or tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks.
- To remove ticks that are embedded in skin, utilize a tick key. Alternatively use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Follow AECOM incident reporting guidelines to report the tick bite within 4 hours and notify the Manager or Supervisor.
- Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If you notice this type of pattern or rash resulting from a tick bite, immediately report the issue to your supervisor and follow the incident reporting requirements for your business group.
- If you experience symptoms such as fever, headache, fatigue, and a skin rash, you should immediately visit a medical practitioner as Lyme disease is treated easily with antibiotics in the early stages, but can spread to the heart, joints, and nervous system if left untreated.

4.7.5 Chiggers

- Chiggers are mite larvae, approximately ½ millimeter in size, and typically invisible to the naked eye. While chiggers are not known to carry infectious diseases, their bites and resulting rashes and itching can lead to dermatitis and a secondary infection.
- Chiggers are typically active from the last hard freeze in the winter or spring to the first hard freeze. They are active all year in the Gulf Coast and tropical areas.

4.7.6 Spiders

- Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the U.S. and others outside the U.S. inject a toxin that causes extensive tissue damage and intense pain.
- Additional information on spider identification can be found in attachment *S3AM-313-ATT3 Poisonous Spider Identification*.

4.7.7 Mosquitoes

- When a mosquito bites, it injects an enzyme that breaks down blood capillaries and acts as an anticoagulant. The enzymes induce an immune response in the host that results in itching and local inflammation. The tendency to scratch the bite sites can lead to secondary infections.
- CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:
    - Eastern Equine encephalitis
    - Western Equine encephalitis
    - West Nile Virus
    - St. Louis encephalitis
    - La Crosse encephalitis
- Mosquitoes can transmit the West Nile Virus and other forms of encephalitis after becoming infected by feeding on the blood of birds which carry the virus.
- Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death, so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus. Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3AM-313-ATT4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.7.8 Bees, Wasps and Hornets

- Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground. Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously. Avoid reaching into areas where visibility is limited.
- If you see a nest in the area you are working in stop work. Contact the Manager or Site Supervisor for procedures to have the nest removed.

- If stung by a wasp, bee or hornet, notify a co-worker or someone who can help should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Follow AECOM incident reporting guidelines to report the sting within 4 hours and notify the Manager or Supervisor immediately. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.

4.7.9 Fire Ants

- The fire ant (southern and western U.S.) and the European fire ant (northeastern U.S. and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

4.7.10 Personal Protective Equipment (PPE)

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Gloves shall also be worn consistent with the recommendations of the site-specific SWP and/or THA to minimize hand exposure.
- Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.
- See *S3AM-313-ATT2 Ticks* for configuration of clothing for protection against ticks and insects.
- Application of insect repellent to clothing and/or exposed skin. Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
- Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, employees can use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work. If permethrin is unavailable employees can apply DEET to their skin and let dry prior to putting FRC on.
    - Oil of Lemon Eucalyptus is a plant-based insect repellent on the market as Repel Lemon Eucalyptus. The products have been proven to be effective against mosquitoes, deer ticks, and no-see-ums for up to six hours. Derived from Oil of Lemon Eucalyptus, this non-greasy lotion or spray has a pleasant scent and is not known to be toxic to humans. The spray or lotions will be effective for approximately two to six hours and should be reapplied every two hours to sustain protection. Lemon Eucalyptus products cannot be applied to fire retardant clothing.
    - Permethrin is an insecticide with repellent properties registered with the Environmental Protection Agency and recommended by the CDC.
        - Permethrin is highly effective in preventing tick bites when applied to clothing, but is not effective when applied directly to the skin. Two options are available for Permethrin treatment of clothing worn during field work: 1) pre-treatment of fabric by the clothing manufacturer; or 2) manual treatment of their personal clothing using Permethrin spray in accordance with recommendations manufacturers recommendations. This will likely require treatment at home or the office prior to field mobilization. Caution should be used when applying Permethrin as it is highly toxic to fish and house cats. AECOM strongly recommends the first option (employees obtaining pre-treated clothing) to avoid the time required, potential risk, and housekeeping issues involved with manually treating the clothing with spray. Purchase pre-treated clothing in accordance with *S3AM-208-PR1 Personal Protective Equipment* and with the approval of your Supervisor or Manager.
        - The Permethrin pre-treatment is odorless and retains its effectiveness for approximately 25 washings. After 25 washings, the pre-treated clothing will be

considered no longer effective and removed from service. Clothing that has been manually treated by employees will be considered effective for five wash cycles.

- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that shall be applied directly to the skin. Supervisor or Manager approval is required prior to purchase.
- If the employee opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they shall either: 1) wear Tyvek® coveralls taped to the boots, or 2) wear full-length clothing consisting of long-legged pants and long-sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an oil of lemon eucalyptus to their work clothing.
- Safety Data Sheets (SDS) for the repellents, lotions, and cleansers discussed in this Procedure are not required because the repellents, lotion, and clothing are consumer products used in the manner intended for the general public. Although not required, a SDS should be obtained for the products used and placed into the office SDS library and site-specific safety plan.

4.8 Poisonous Plants

4.8.1 Habitat Avoidance, Elimination and/or Control

- If poisonous plants are identified in the work area, employees will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other employees to avoid the designated area. If employees decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the Manager (and Client as appropriate) for approval.
- If removal of the plants is considered, it should be subcontracted to a professional landscaping service that is capable and experienced in removing the plant. If herbicides are considered for use, a discussion shall need to occur with the Manager (and Client as appropriate) to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- Employees shall not attempt to physically remove poisonous plants from the work area unless a clearing procedure, including PPE, is prepared in advance and approved by the SH&E Manager. The clearing procedure should be included in the SH&E Plan and THA and the required PPE specified.

4.8.2

Poisonous plants that employees should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed[2] (or giant cow parsnip), wild parsnip, devil's club and stinging nettle. Many others are extremely poisonous to eat (e.g., poison hemlock; water parsnip) – do not eat anything that has not been identified. Refer to *S3AM-313-ATT5 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows in a variety of forms such as a low sprawling shrub, dense ground cover, or a thick woody vine that grows high into the tree canopy. Poison oak (*Rhus diversiloba*) is typically a low shrub in drier soils. Both of these plants have leaves of three and white berries. Poison sumac (*Rhus vernix*) is a tall shrub that is less prolific in distribution. It grows in wet areas, has a compound leaf with a red leaf stem (rachis), and white berries. All of these plants possess urushiol oils in all parts of the plant. Touching the plant causes an itchy skin rash that can show up within 4-72 hours following contact. People have a wide range of reactions including swelling, itching, rash and bumps, patches or blisters.
- Uroshiol oil can also transfer onto clothing and equipment. The oil can remain active on surfaces for up to 5 years and can be transferred to your skin.

[2] Phytodermatisi producer: keep skin covered and wash well after exposure

- Wild parsnip is found throughout the U.S. and contains a poison that produces a rash similar to poison oak and ivy. Unlike poison oak and ivy, the active oil will not be present on unbroken leaves. See *S3AM-313-ATT6 Wild Parsnip Identification* for additional information and photos of wild parsnip.
- Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the giant hogweed (*Heracleum mantegazzianum*), a plant that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 16 feet (5 meters) in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by meadow parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum lanatum*). Meadow parsnip can be very abundant on disturbed sites.
- Nettles, particularly stinging nettle (*Urtica dioica*) and wood nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.
- Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. These include the cactus (*Opuntia spp.*), devils club (*Oplopanax horridum*), and prickly-ash (*Zanthoxylon americanum*).

4.8.3 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying to not eat any berries or plants if you are unsure of their identity.

- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.

4.8.4 Personal Protective Equipment (PPE)

- Employees conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. Employees shall not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants shall be treated as contaminated, removed from the body in a manner that the contamination is not spread, and placed in plastic bags for disposal.
- Personal clothing that has been exposed to poisonous plants shall be decontaminated with a poisonous plant cleanser such as Tecnu® or removed in a careful manner, bagged and washed separately from other clothing to remove urushiol.
- Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
- If foliage is being cleared and includes poisonous plants, exposed skin shall be treated with a dermal barrier cream such as Tecnu®'s Oak 'n Ivy Armor or Enviroderm's Ivy Block and either a full-face respirator or a half-face respirator (with goggles) fitted with a P-100 (HEPA) dust filter.

4.9 Bird Droppings and Biological Soil Hazards

4.9.1 Work in any area where pigeons or other flying animals (e.g. bats) may nest requires a written statement from the client which states the potential for, and extent of, accumulation of excrement on/in the structure from pigeons or other winged animals.

4.9.2 Substantial accumulations of droppings can pose physical and health risks as slippery surfaces (if wet) and if the material is disturbed and becomes airborne, it can be inhaled or ingested if personal hygiene practices are not implemented. Inhalation of airborne droppings can cause diseases such as histoplasmosis. Exposure to surfaces with bird droppings shall be safeguarded by implementing proper work practices, training employees for awareness and using PPE. See *S3AM-313-ATT8 Bird Droppings*.

4.9.3 Tularemia is a problem with contaminated soil in some locations. Tularemia is a disease of animals and humans caused by the bacterium *Francisella tularensis*. Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Workers can contract Tularemia through tick and deer fly bites, but also through inhalation of contaminated aerosols or agricultural dusts. Check work areas for carcasses before disturbing the ground (e.g. mowing, brushing, grubbing, excavation, etc.).

4.10 Personal Hygiene and Body Checks

4.10.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.

4.10.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.

4.10.3 Employees shall shower as soon as practical after working in the field and examine their bodies for the presence of ticks, insect bites, rashes, or swollen areas. If imbedded ticks are found, they should be removed using the technique described in *S3AM-313-ATT2 Ticks*.

4.11 Employees shall immediately notify their Manager or Supervisor of the presence of an imbedded tick, bee, wasp or hornet sting, other insect bite, rash, or any abnormal reaction. Reporting shall occur within 4 hours for a significant incident and 24 hours for all other SH&E incidents, and in accordance with *S3AM-004-PR Incident Reporting, Notifications & Investigation.*

4.12 The Manager or Supervisor shall forward the report to the SH&E Manager for follow up.

5.0 Records

None

6.0 Attachments

6.1 S3AM-313-ATT1 Biological Hazard Assessment Flow Chart

6.2 S3AM-313-ATT2 Ticks

6.3 S3AM-313-ATT3 Poisonous Spider Identification

6.4 S3AM-313-ATT4 Mosquito Borne Diseases

6.5 S3AM-313-ATT5 Plants of Concern

6.6 S3AM-313-ATT6 Wild Parsnip Identification

6.7 S3AM-313-ATT7 Alligators

6.8 S3AM-313-ATT8 Bird Droppings

6.9 S3AM-313-ATT9 Large Carnivores & Ungulates

6.10 S3AM-313-ATT10 Bear Safety

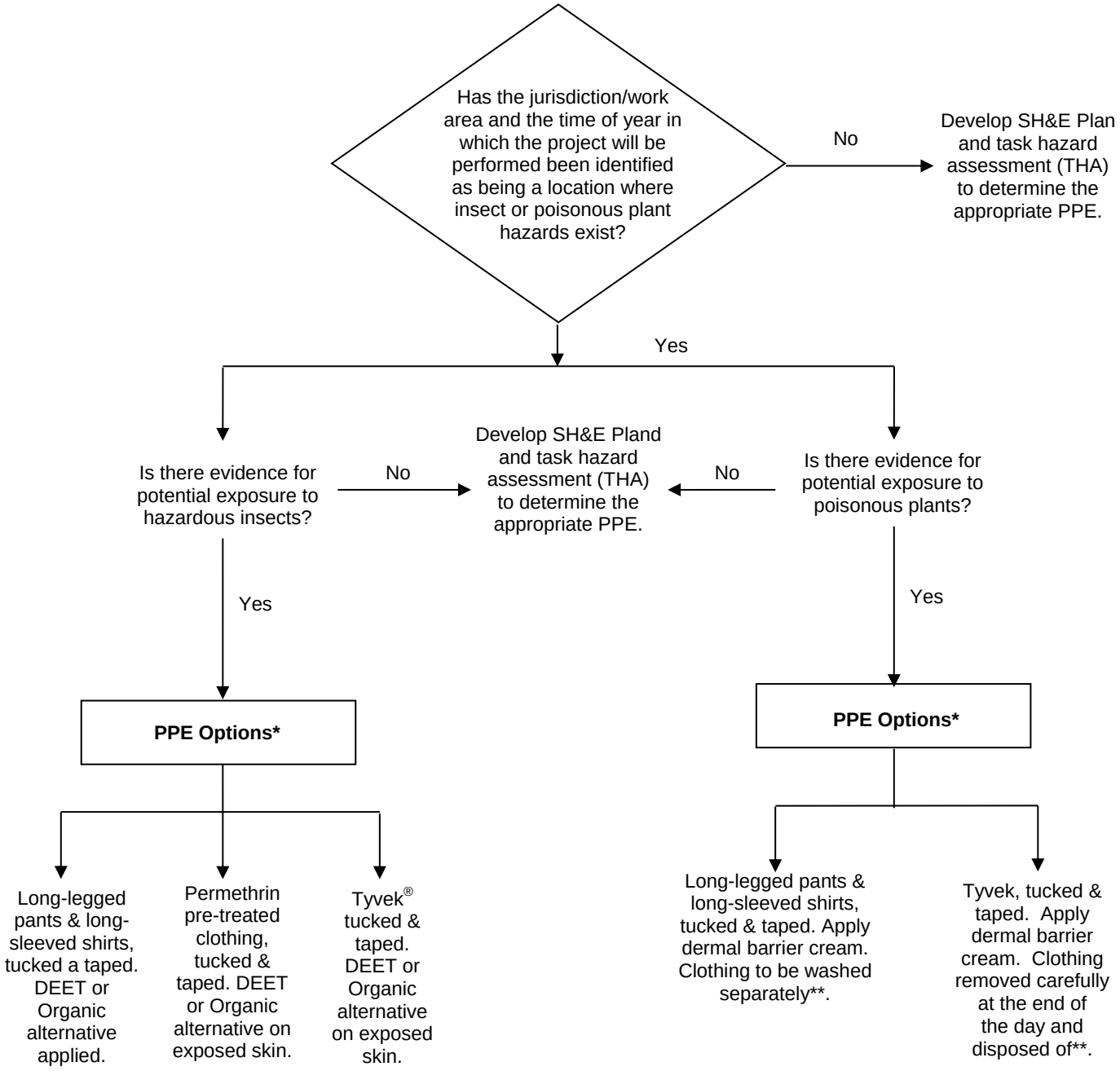
6.11 S3AM-313-ATT11 Small Mammals

6.12 S3AM-313-ATT12 Snakes & Scorpions

Americas

Biological Hazard Assessment Decision Flowchart

S3AM-313-ATT1



* indicates that when both insect and poisonous plant hazards are recognized hazards at a project site, the most conservative combination of the available PPE choices will be selected. Include the selected PPE option in the respective SH&E Plan and THA.

** indicates that clothing that has been known or suspected to have come in contact with poisonous plants must be washed before it can be worn again. Similarly, Tyvek® that has been known or suspected to have come in contact with poisonous plants will be disposed of rather than reused during a subsequent day or project.

Americas

Ticks

S3AM-313-ATT2

1.0 Background

1.1 The Public Health Agency of Canada and the Centers for Disease Control and Prevention work with States and Provinces, health authorities and other experts on research to define and monitor the occurrence of the ticks that carry bacterium that cause disease, including but not limited to:

1.1.1 *Borrelia burgdorferi*, the bacterium that causes Lyme disease.

- In the United States and Canada, the black-legged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western black-legged tick (*Ixodes pacificus*) are the species known to transmit this disease-causing agent, as well as other less common agents.

1.1.2 *Rickettsia rickettsia,* the bacterium that causes Rocky Mountain Spotted Fever.

- In the United States and Canada, the American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), and brown dog tick (*Rhipicephalus sanguineus)* are known to transmit this disease-causing agent.

1.1.3 *Francisella tularensis*, the bacterium that causes Tularemia.

- In the United States, these include the American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), and Lone star tick (*Amblyomma americanum*).

1.1.4 *Ehrlichiosis*, the general name to describe several bacterial diseases that affect animals and humas.

- In the United States, these include the black-legged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western black-legged tick (*Ixodes pacificus*), and Lone star tick (*Amblyomma americanum*).

1.2 Consult local health authorities to determine where tick populations are established or emerging. Locations where distribution may have previously been limited may show evidence of larger populations. Employees working in or adjacent to areas where there are established tick populations may have a greater chance of contact with ticks.

1.3 While there is a higher risk of coming in contact with infected ticks in areas where populations are established, there is also a low risk of tick-borne diseases being contracted almost anywhere in the Americas as migratory birds transport infected ticks over large geographic distances. Take precautions to reduce tick contact.

1.4 Lyme Disease

1.4.1 The rate of infection of ticks with the bacterium that causes Lyme disease varies. Infection rates are typically higher in adult ticks compared to the other stages (nymphs and larvae).

1.4.2 Despite the lower rates of infection, people are most likely to acquire Lyme disease from a nymph because this stage is so small and thus more likely to go unnoticed and feed for a sufficient amount of time for the Lyme disease bacterium to be transmitted (24-36 hours).

1.4.3 Infection rates are often greater in tick populations that have been established for long periods of time compared to newly established ones.

1.4.4 Lyme disease patients are most likely to have illness onset in April through November with onset peaking in June, July, or August and less likely to have illness onset from December through March

2.0 To Remove Attached Ticks



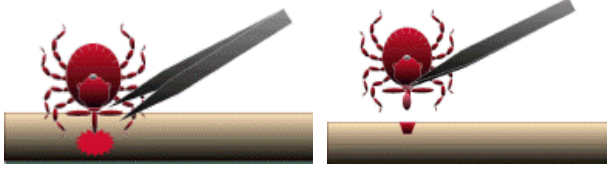
2.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.

2.2 Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your health care provider if illness occurs.)

2.3 After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

2.4 Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms. Skin accidentally exposed to tick fluids can be disinfected with iodine scrub, rubbing alcohol, or water containing detergents.

2.5 Save the tick for identification in case you become ill. This may help your doctor make an accurate diagnosis of potential diseases by determining what type of tick it is. Place the tick in a sealable plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.



3.0 Folklore Remedies Don't Work

3.1 Folklore remedies, such as the use of petroleum jelly or hot matches, do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided.

4.0 Configuration of Clothing

4.1 Loose-cuff trousers must be tucked into socks, wrapped with duct tape (or equivalent) completely around the cuff of the sock up on to the surface of the pant leg to prevent entry of insects between the sock and pants, and preferably reverse-wrapped with “sticky” side out (see figure below).



Americas

Poisonous Spider Identification

S3AM-313-ATT3

Black Widow Spider





- Found in warm, dry parts of throughout the United States and extend into the southern edge of Canada.
- Prefer to spin their webs in dark, sheltered spots close to the ground
- Abdomen usually shows hourglass marking.
- The female is 1 to 1.5 inches (3-4 centimeters) in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

Brown Spiders (Recluse)





- Central and South U.S., although in some other areas, as well.
- 0.25-to 0.5-inch (0.6 to 1.3 centimeters)-long body and the size of silver dollar.
- Hides in decaying wood, baseboards, ceilings, cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.

Hobo Spider





- Primarily found in Washington, Oregon, Wyoming, Colorado, Utah, Montana and the Pacific Northwest United States.
- 0.4-to 0.5-inch (1.1 to 1.3 centimeters)-long body and the size of silver dollar.
- Because of its common features and color, it is easily confused with other spider such as Brown Recluse Spiders.
- They rarely climb vertical surfaces and are uncommon above basements or ground level.
- Bite is initially painless. After 24 hours, the bite develops into a blister and after 24-36 hours, the blister breaks open, leaving an open, oozing ulceration.
- If bitten, see physician as soon as possible.

Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If bitten by a spider, attempt to identify the spider, notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or any swelling or numbness beyond the site of the bite.

Americas

Mosquito-Borne Diseases

S3AM-313-ATT4

1.0 Background

1.1 Employees working outdoors in the Americas may be exposed to mosquitoes that may transmit illnesses, including Encephalitis and Dengue.

1.2 Dengue is transmitted by the bite of a mosquito infected with one of the four dengue virus serotypes. Dengue is endemic to South America**.**

1.2.1 Dengue is a febrile illness that affects infants, young children and adults with symptoms appearing 3-14 days after the infective bite.

1.2.2 Symptoms range from mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash.

1.2.3 Severe dengue (also known as dengue hemorrhagic fever) is characterized by fever, abdominal pain, persistent vomiting, bleeding and breathing difficulty and is potentially fatal.

1.3 West Nile encephalitis is an infection of the brain that is caused by a virus known as the West Nile virus.

1.3.1 Most individuals infected with WNV remain asymptomatic. West Nile (WN) fever is typically a mild illness lasting 3 to 6 days.

1.3.2 The main symptoms are sudden onset of fever with chills, rash, malaise, headache, backache, arthralgia, myalgia and eye pain. Other non-specific symptoms may include nausea, vomiting, anorexia, diarrhoea, rhinorrhoea, sore throat, and cough.

1.3.3 The main route of infection is via the bite of a mosquito that has been infected by feeding on West Nile Virus infected birds.

1.4 Arboviral encephalitis is a virus that exists in various forms in global distribution. Numerous forms occur in the Americas, including the following four primary forms that can be transmitted by mosquitoes:

1.4.1 Eastern equine encephalitis (EEE) – United States and Canada

1.4.2 Western equine encephalitis (WEE) – United States

1.4.3 St. Louis encephalitis (SLE) – United States and Canada

1.4.4 La Crosse (LAC) encephalitis.all of which are transmitted by mosquitoes – United States

1.5 Mosquitoes are known to breed in standing water; therefore, when standing water is found at a job site, actions should be taken to drain the water. Typically, mosquitoes will fly only a quarter of a mile (400 meters) from their breeding location.

1.6 The local Public Health Department and Center for Disease Control and Prevention (CDC) should be consulted to determine what diseases transmitted by mosquitoes are present and exposure prevention recommendations.

Americas

Plants of Concern

S3AM-313-ATT5

1.0 Background

1.1 Poison ivy, oak and sumac (poisonous plants) pose a significant threat to AECOM employees due to the dermatitis that results from exposure to the oil on these plants, called urushiol.



Poison Oak **Poison Sumac** **Poison Ivy**

1.2 Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the infected area, increasing susceptibility for an infection to result from the rash.

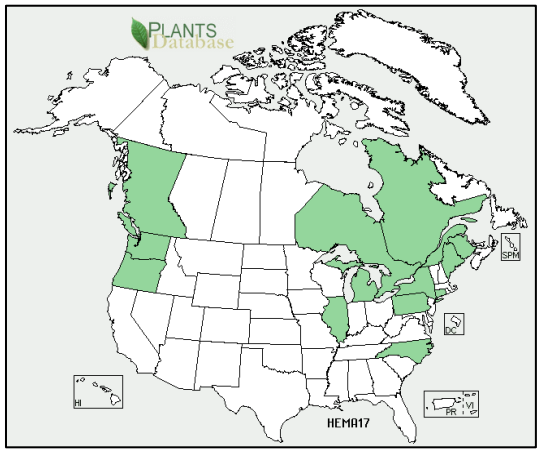
1.3 It should be noted that each time an employee is exposed to urushiol, it increases the severity of the reaction they will have in subsequent exposures.

1.4 Giant Hogweed is a phototoxic plant that causes skin irritation on contact with the sap and, when exposed to sun causes deep blisters.

1.5 Blisters from contact with Giant Hogweed can form black or purplish scars that can last for several years. Even a tiny amount of the sap in the eyes can cause temporary to permanent blindness.



Giant Hogweed



Giant Hogweed Distribution

Image obtained from www.gclandscape.com

2.0 Treatment

2.1 In cases that involve severe rashes, medical treatment may be necessary to control the rash.

2.2 Employees that develop a rash as a result of exposure to poison ivy, oak or sumac should report the exposure immediately to their Supervisor, Project Manager and Region Safety, Health and Environment Manager.

Pacific Poison Oak Distribution



Image obtained from www.cdc.gov

Atlantic Poison Oak Distribution



Image obtained from www.cdc.gov

Poison Sumac Distribution



Image obtained from www.cdc.gov

Western Poison Ivy Distribution



Image obtained from www.cdc.gov

Eastern Poison Ivy Distribution

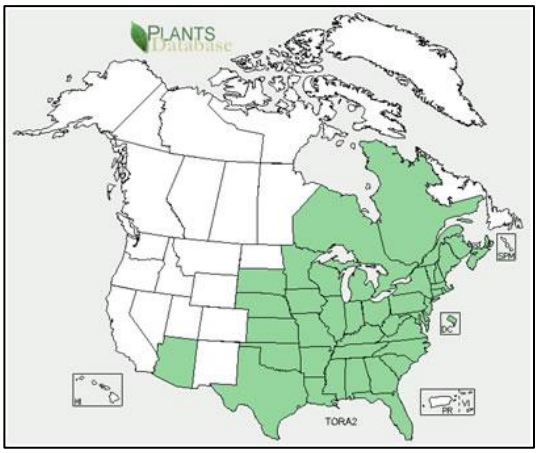


Image obtained from www.cdc.gov

Americas

Wild Parsnip Identification

S3AM-313-ATT6

1.0 Background

1.1 Wild parsnip (also known as poison parsnip) looks similar to a large carrot plant and is found in open places along roadsides and in waste places throughout the United States and Canada.

1.2 This plant produces a compound that causes severe blistering and discoloration after being exposed to sunlight—a condition known as photodermatitis. That is, when the skin comes in contact with this plant's juice and then is exposed to UV light, a severe burn develops.

2.0 Hazard

2.1 Everyone can get burned by wild parsnip. Unlike poison ivy, you don't need to be sensitized by a prior exposure. However, wild parsnip is only dangerous when the juice from broken leaves or stems gets on your skin—therefore, you can touch and brush against the undamaged plant without any danger.

2.2 If one gets some of the sap of hogweed (or meadow parsnip or cow parsnip) in contact with skin, it is critical that they stay out of the sun for 8 hours. If one needs to remove the plant they should be completely covered with overalls, gloves, hat and safety glasses.



Americas

Alligators

S3AM-313-ATT7

1.0 Hazard

1.1 Your chance of encountering an alligator is greatest during the animal's courtship and mating season, which takes place from March through September. This is when male alligators become most dominant and aggressive as they try to intimidate rival males and attract females by their show of power. Some males end up having to travel to find a mate. July through September is when mother alligators are guarding nests.

1.2 Mating season takes up much of the warmer months - a very popular time in the southeastern USA for outdoor activities - and alligators are solar-powered, so-to-speak. The warmth from the sun fires up their metabolism, giving them renewed energy; and renewed energy means great potential for conflict.

2.0 Encounter



2.1 The alligator is naturally wary of humans, and will flee quickly if you get too close to it, or it may utter a very audible and compelling warning hiss. In some cases, however, alligators may charge or attack. Here are some examples of such cases:

2.1.1 An alligator that is accustomed to being fed by humans may not be so shy.

2.1.2 An alligator that is surprised and alarmed by your approach may attack, thinking that it is being attacked itself.

2.1.3 A mother alligator caring for her nest or for live babies. If you see alligator babies, or if you encounter a nest (usually a mound of vegetation mixed with mud), remove yourself to a safe distance, the mother alligator is sure to be close by. If you get close, the mother may sound a very audible and intimidating warning hiss. Such a nest may be difficult to identify for a non-expert, but it is likely the mother will issue you a warning.

2.1.4 Alligator mothers are well-known to be practically fearless when defending their offspring, whether the little ones have hatched or not. A mother alligator was observed leaping, jaws agape, to attack a helicopter as it approached the nest area to land. The helicopter carried biologists studying alligator nests.

2.2 Also be careful near heavy vegetation in or near the water's edge. This is where an alligator likes to enjoy privacy and peace during the daylight hours. If you trudge through there and surprise it, the outcome may not be positive.

2.3 Generally, a good minimum distance to keep between you and an alligator or nest is 15 feet (4.6 meters).

2.4 When trying to get past an alligator, make sure not to walk between the alligator and the water, because if it's spooked, it's going to run to the water.

2.5 If an alligator does approach in a threatening manner, make as much noise and movement as possible. This should show the alligator that he has taken on more than he can handle and he'll back away.

3.0 Alligator Charge

3.1 The alligator is not a natural runner. Those short legs obviously don't serve it like a horse's legs do, and the alligator can actually tire out in a relatively short time. When it charges after a human or animal, it is either

trying to scare it away or seize it. It has a fast and furious burst of energy which serves it well for stealth hunting -- grabbing prey when it doesn't expect it. Furthermore, the reptile is opportunistic, which means, quite simply, it doesn't like to work very hard to get its food if it doesn't have to.

3.2 In the very rare event you are charged or chased by an alligator, move in as straight a line as possible away from it as fast as you reasonably can. In many cases, the vegetation features of the wild will serve to protect you by slowing the alligator down, like trees, bumps, bushes, etc. -- your comparatively long legs usually make it easier for you to maneuver through the trees and brush than an alligator's short legs do.

3.3 Most adult humans can outrun even a fast crocodilian, which has been clocked at a maximum of about 10 miles per hour (mph) (17 kilometers per hour [kph]), compared to a human speed of 15-17 mph (24-27 kph). But this doesn't matter much; an alligator will often give up the chase because it sees that the runner is moving away too quickly, and realizes that too much effort will be required to continue pursuit.

3.4 You may have heard somewhere that the zigzag run (running in a "z" pattern, side-to-side) is a good idea, but this is not only an unnecessary maneuver but probably a very unwise one. Here's why:

3.4.1 Unless you're an Olympic athlete, running zigzag over natural topography increases your risk of tripping and falling over rocks, plants, roots, and the like. And it goes without saying that falling while being pursued by an alligator is not good.

3.4.2 Furthermore, an alligator doesn't have the degree of stereoscopic vision we have. It actually has a small 'blind spot' directly in front of it. Hence, the alligator's vision is most effective in the 'sides' of its field of view. So, running zigzag not only slows your rate of distance from your pursuer, it may clearly indicate to the animal exactly where you are; even this point hardly matters since in many cases the alligator may keep its eyes shut while pursuing so as not to get them hit by twigs, grass stalks and branches in its path.

3.4.3 Finally, an alligator bites very effectively in a side-swiping motion, so if you are trying to run zigzag and are slowed down by plants, rocks, or other obstacles, the backwards flying leg of a running human is an optimal target for side-swiping, chomping jaws (the operative word here is "side").

3.5 Simply put, when faced with an attack, move directly away from the alligator as quickly as possible, navigating the terrain as carefully as possible. The zigzag idea will likely not serve you well.

4.0 Alligator Attack

4.1 If it seizes prey, and the prey fights back hard, the alligator may release it, depending on factors such as its own size relative to that of the victim, its own level of aggression, and its measure of hunger. Merely struggling to break free may not be enough counter-aggression to stop an alligator, and may actually prompt a devastating "death roll" response, in which the reptile furiously spins on its central axis to tear muscle and bone free of the victim's body.

4.2 These armored saurian are among the toughest beasts in the animal kingdom, so an attack victim should channel his or her nervous energy and will to survive and take the offensive by fighting hard. Not struggling...fighting very, very, very hard. Others on hand during such an event may be able to help by fighting the reptile, too. This should include punching the snout, poking the eyes, and even jabbing the ears, which are seen as small slits behind the eyes.

Americas

Bird Droppings Safe Work Practices

S3AM-313-ATT8

1.0 Background

1.1 According to the National Institute for Occupational Safety and Health (NIOSH), histoplasmosis is an infectious disease caused by inhaling spores of a fungus called *Histoplasma capsulatum (*abbreviated *H. capsulatum)* that may inhabit accumulated masses of pigeon droppings and excrement of other birds and flying animals. Its symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. This form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated. The acute respiratory disease form of histoplasmosisis is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or non-productive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years. If symptoms occur, they may start within 3 to 17 days of exposure, with an average of 10 days. On a positive note, histoplasmosis is not contagious.

1.2 Psittacosis, although primarily a respiratory disease, can cause a wide variety of clinical manifestations. Generally, about 10 days after infection occurs, the clinical illness begins abruptly with fever, chills, weakness, fatigue, muscle pain, anorexia, nausea, vomiting, excessive sweating and difficulty with breathing, headache, backache, and sensitivity to light.

1.3 Hypersensitivity pneumonitis is also known as pigeon breeder's disease.

2.0 Symptoms

2.1 The acute form of hypersensitivity pneumonitis is clinically characterized by chills, fever, cough, breathlessness without wheezing, and malaise 4-10 hours after exposure. In general, an acute attack subsides after 18 to 24 hours.

3.0 Treatment

3.1 If a person should develop any of the symptoms as noted above, or others, it is important to see a physician and inform him of an exposure to pigeon/bird or bat excrement. A failure to diagnose the preceding conditions could occur if a treating physician is unaware of a patient's exposure to pigeon/bird or bat excrement.

4.0 Prevention

4.1 Prior to work in any area where pigeons or other flying animals may nest, a written statement from the client shall be obtained in regards to the potential for, and extent of, accumulation of excrement on/in the structure from pigeons and other winged animals.

4.2 The client shall be asked to provide appropriate details as to the basis for their statement (e.g., date of last visual survey for pigeon/bird or bat excrement accumulation, date of last excrement removal effort, etc.).

4.3 In no case will an AECOM employee or contract employee be permitted to commence structure inspection procedures without the Project Manager having received and evaluated the aforementioned written statement from the client.

4.4 According to NIOSH, the best way to prevent exposure to *H. capsulatum* spores during survey and inspection work is to avoid situations where excrement and other potentially contaminated material can become airborne and inhaled. Therefore, it is preferable that the efforts to determine if, and to what extent, there is an accumulation of pigeon/bird or bat excrement on/in structures, or the efforts to clean-up/remove/dispose of such contaminated material, be left to the client or subcontracted out.

5.0 Safe Work Practices

5.1 In those cases where AECOM employees or contract employees are contracted by the client to determine the extent of accumulation of animal excrement in/on structures, the following minimum safety and health precautions shall be taken. (NOTE: precautionary measures are based on recommendations and best practices prescribed in the NIOSH 2004 public document titled *Histoplasmosis – Protecting Workers at Risk*).

5.2 All workers shall wear disposable protective clothing (Tyvek® coveralls). Disposable overalls with hoods shall be donned when working in areas where *H. capsulatum* spore-contaminated material is likely to fall from overhead.

5.3 All workers shall wear disposable shoe coverings fitted with ridged soles made of slip-resistant material to reduce the likelihood of slipping on wet or dusty surfaces. Gloves shall be worn.

5.4 All workers shall wear a full facepiece air purifying respirator fitted with P100 (HEPA) cartridges. If entering an enclosed area in which the extent of excrement contamination is unknown, additional protective measures shall be taken such that workers shall wear a powered air-purifying respirator (APR) with full facepiece fitted with P100 (HEPA) cartridges. Any variance from these requirements must be approved by the Region Safety, Health an Environment Manager. Workers donning APRs shall be medically screened, cleared, and trained in their proper use in accordance with AECOM safety program standards.

5.5 If contaminated material must be disturbed for purposes of removal/disposal or during the structure inspect process, it shall be wetted down prior to all work and will be rewetted as necessary to minimize airborne dusting.

5.6 After working in *H. capsulatum* spore-contaminated areas and before removing any respiratory protective equipment, workers shall remove all protective clothing and shoe coverings and seal them in a heavy-duty plastic bag for disposal.

5.7 Workers shall observe a high degree of personal hygiene, even if the exposure is casual. Special care shall be taken to wash hands, face, and other areas of exposed skin thoroughly before eating, drinking or smoking.

Americas

Large Carnivores & Ungulates

S3AM-313-ATT9

1.0 Hazard

1.1 Most wild carnivores in the feline family (cougars, lynx, and bobcat) or the canine family (wolves and coyotes) are more predictable than bears and are not predatory towards humans; however, all wild animals can be dangerous if they feel threatened or if they are sick or starving.

1.2 Most ungulates (deer, moose, elk, and caribou) will avoid humans and will flee as soon as a human is sighted; however, females with young (during May and June) and males during the mating season (September to November) can be very aggressive, especially if provoked.

2.0 Personal Protective Equipment

2.1 Noise makers such as bear bangers, whistles and bells can be used as deterrents for an approaching animal.

2.2 Pepper (bear) spray can be used to ward off an imminent attack.

3.0 Safe Work Practice

3.1 Most negative encounters with ungulates or carnivores can be avoided with a few key preventative measures:

3.1.1 When working in wilderness isolation, always travel in pairs and make lots of noise.

3.1.2 Always store food in air-tight containers away from sleeping areas (if camping) and never carry strong smelling foods which could attract animals.

3.1.3 Keep your eyes open for fresh animal signs which may indicate a dangerous situation:

- Extensive fresh rubbing on branches in the fall might indicate the presence of a rutting male ungulate that may become aggressive to defend a potential mate.
- A fresh kill or carcass which might indicate the presence of a carnivore that may become aggressive to defend its food.

3.2 Maintaining a distance of at least 100 feet (30 meters) allows large animals an escape route. If you notice any signs of aggression or behavioral changes, you should move away to a safe location. Wildlife should not be enticed by reaching out or simulating calls.

3.3 Pets should be kept secure and away from wildlife as their actions can provoke an attack. Moose, deer and other wildlife may appear quite docile; however, if a dog makes them feel threatened, their behavior can become unpredictable.

3.4 **If you are approached by a carnivore (wolf, coyote, or cougar):**

3.4.1 Pick up small children immediately.

3.4.2 Try to appear bigger, hold your arms or an object over your head.

3.4.3 Face the animal and retreat slowly. Do not run or play dead.

3.4.4 Maintain steady eye contact with the animal.

3.4.5 If the animal continues to approach, deter an attack by yelling, waving a stick or throwing rocks.

3.4.6 If you are attacked, fight back. Hit the animal with a heavy stick or rock.

3.5 **If you are approached by an ungulate (moose, elk, deer, bison or caribou):**

3.5.1 An angry moose, elk or deer will face you with its head and ears lowered.

3.5.2 Back away slowly.

3.5.3 Look for something to get behind like a tree or a car. You can go faster around an obstacle than the ungulate can.

3.5.4 An ungulate is more likely to bluff charge but if it continues the charge and you are attacked in the open, curl up in a ball on the ground. Always protect your head with your arms and lie still.

3.5.5 Stay still after the attack until the ungulate moves away.

Americas

Bear Safety

S3AM-313-ATT10

1.0 Hazard

1.1 An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.

1.2 The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criterion, as bears have been encountered within city limits, especially near landfills.

1.3 The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.

1.4 Preparing staff for any type of encounter is key to managing the risk.

2.0 Personal Protective Equipment

2.1 The best deterrent of a “bad bear encounter” is knowledge: a good understanding of the ecology and the behavior of the bears that will likely be encountered.

2.2 Bear Spray and Bear Bangers

2.2.1 Staff must have hands-on training for the safe use of bear spray (a pre-season practice run is a good use of expired bear spray).

2.2.2 Prior to work commencing, staff must ensure that the bear spray they are carrying is still valid and not past its expiration date.

2.2.3 During travel, bear spray must be sealed in an airtight container or bag and must not travel in the cab of a vehicle, aircraft, or helicopter.

2.3 Firearms

2.3.1 Environments and conditions which pose a high risk of bear encounters, may warrant the use of an armed wildlife monitor. Project managers, in consultation with appropriate project staff and Safety, Health and Environment Management, are responsible for determining the level of risk for their projects and whether or not such measures are required.

2.3.2 A person hired as an armed bear monitor must be properly trained in wildlife monitoring as well as certified in the expert usage of firearms.

2.3.3 The usage of an armed bear monitor is intended only as an additional precautionary measure to be used in specific environments to ensure the protection of field staff; staff should still be equipped and trained appropriately for the risk.

3.0 Restrictions

3.1 Staff must not work alone in areas where there is a medium or high risk of a bear encounter.

3.2 AECOM personnel shall not carry firearms or attempt to function as a wildlife monitor and/or perform their professional duties. For possible exceptions contact the Regional SH&E Manager who will evaluate the potential hazards with Regional Manager and Legal and provide written response. This can only be over-ridden with expressed permission of Region Executive and AECOM Chief Resilience Officer, refer to *WP-001-PR Firearms Standard*.

4.0 Training

4.1 In-house Bear Awareness training must be taken by all field staff who work in bear country every three years at a minimum, or more often as required.

4.2 The Bear Awareness training involves testing and improving the employee's knowledge about bear encounters, watching videos regarding bear awareness and behavior, and participating in group discussions about how to avoid and how to respond to bear encounters.

4.3 Specific considerations are given to black bear, grizzly bear, and polar bear encounters.

5.0 Safe Work Practice

5.1 Staff must be aware of wildlife signs and avoid wildlife encounters.

5.2 Bear Signs

5.2.1 Fresh tracks – It is often better to see the bear's tracks than to see the actual bear. If you can tell the direction that the bear is travelling in, it is prudent to change your course of direction. Bears will travel down the same pathways people or other large animals use. If you have a clear track you can determine which type of bear has passed through the area. If you see more than one track, you can tell that it is possibly a female with cubs. Avoid females with cubs!

5.2.2 Scat – Bear scat will look different depending upon the bear's diet. Close examination of bear scat can sometimes give you an indication of what the bears have been eating at that time of year. If the scat contains remnants of human garbage, there is a human food conditioned bear in the area. These bears associate people with food and can be the most dangerous type of bear to encounter.

5.2.3 Animal carcasses – IF YOU COME ACROSS A CARCASS, LEAVE THE AREA IMMEDIATELY. Grizzly bears will often cover their kills for a few days and let it rot, then come back and eat it. THE BEAR WILL STAY CLOSE BY. Grizzly bears will defend their kill and this is a situation that could prompt a defensive attack by a bear.

5.2.4 Torn-up logs and stumps – Bears will forage for insects in dead logs and rotting trees. You will often see torn up logs and stumps, evidence of their foraging.

5.2.5 Evidence of digging – Holes dug into the ground are often made by grizzly bears digging for roots or ground squirrels. In particular, grizzlies will dig for food in the early spring soon after they leave their dens.

5.2.6 Claw marks on trees – Claw marks can be left on trees by black bears when they have climbed up a tree. Grizzly bears will also leave claw marks on trees and on the ground. Bears will often chew a small tree or a sign-post, so watch for signs of chew marks along the trail.

5.2.7 Hair on trees – Bears will rub against trees, usually trees with rough bark, to scratch themselves. You can find evidence of bears by the hair left in the tree's bark. The higher the hair left on the tree, the bigger the bear. Remember that the bear will often stand on its back legs to scratch its back on the tree.

5.2.8 Daybeds – Bears will be most active in the early morning and in the evening. It would be prudent for field staff to restrict their field activities during the bear's most active foraging times as much as possible. During the heat of the day, bears will rest in daybeds. These can be shallow depressions of piled up leaves in the forest, trampled vegetation, a shallow scrape or a hole. Daybeds are usually located in cool places. Bears will make daybeds along streams and rivers. Daybeds are often associated with feeding places and therefore should be avoided.

5.3 Prevention

5.3.1 Your best defense against bears is to actively practice bear avoidance techniques when working in the field. You can prevent chance encounters by taking the following precautions:

- Know the areas and habitats bears use at different times of the year, and attempt to avoid such areas or be extremely cautious if you have to travel through them.
- Contact the local Fish & Wildlife Office to get current information on the bears in the area. Ask what other camps are in the area and if they are following good bear avoidance practices. (i.e., do they keep a clean camp?) If there are nearby human food sources available, e.g., an open dumpsite, the local bears may not be afraid to approach your camp.
- Always be aware of your surroundings. Stay alert. Watch for signs of bears along your route.
- Use binoculars to look around for bears when you are in open terrain.
- Never approach a bear if you see one feeding in the distance.
- Note the behavior of other wildlife in the area. Flocks of ravens can alert you to a possible animal carcass, and perhaps a bear. The area should be avoided. Bird or squirrel alarm calls might be telling you that a bear is near.
- Whenever possible, travel in daylight and try to avoid areas with restricted visibility, e.g., dense brush.
- Make lots of noise, especially when travelling in dense vegetation. Sing, shout, or talk loudly. You can carry portable air horns or cans of rocks. (Please note that bear bells are not effective – they do not make enough noise to warn a bear that you are approaching. You need to be loud so the bear can hear you coming.) Remember that the noise you make can be masked by loud natural sounds such as the wind or water. Therefore it is possible that the noise you make can go unnoticed by a bear whose attention is focused on feeding. You must make every attempt not to surprise a bear. In areas of loud natural noise, be louder!
- Stay together and travel in groups. Bears are less likely to attack groups of people. When travelling in groups, stay close together. Being in a group doesn't help if the individuals have spread apart along the trail.
- Pets should not accompany you when you are travelling in bear country. If you must take your pet, keep the animal on a short leash at all times. Unleashed dogs will harass bears and once scared, run back to their owner with an angry bear in pursuit.
- Do not wear perfumes or cosmetic products when you are travelling in bear country. Do not mask your human scent.
- All sanitary products should be stored in a similar fashion as food (stored at least 10 feet [3 meters] above site).
- Children should be kept very close by in bear country.
- Carry bear deterrents and know their limitations. Be familiar with how to use the deterrents, how to transport the deterrent safely and under what conditions it is most effective. Carry the deterrent in a belt, out in front and ready to grab at a moment's notice, never in your backpack.

5.4 Field Worker Precautions in Bear Country

5.4.1 Field workers should take extra precautions when working in bear country:

- Make every effort to go out into the field with another person; you should not be working alone in the field. One person can act as a lookout for the other. Keep watch for bear signs.
- Never approach a bear.
- Report where you are going and when you will return every time you leave camp. Have a plan of action if someone does not report back to camp at a specified time.

- Bears do get used to a camp's schedule and you will have fewer surprise encounters if everyone in the camp comes and goes at the same time every day.
- Take a two-way radio with you when you go out into the field.
- Always carry bear deterrents with you in the field and understand each deterrent's limitations. Carry your deterrents on a belt, out in front and ready to use instantly. Do not carry your deterrents in your backpack.
- Keep any food that you take with you sealed in odor-proof/bear-proof containers. Make every attempt to take odorless food with you, not something with a heavy scent.
- Pack out any garbage in odor-proof containers and burn once you return to camp.
- The noise of an ATV or skidoo can scare off a bear. Starting the machine and revving it up can scare off a curious bear. DO NOT CHASE A BEAR WITH AN ATV OR SKIDOO. You may need to drive the ATV around in circles to scare off the bear, but do not chase the bear.
- Take extra precautions when travelling along lakes or stream beds; bears use streams and river beds as travel routes. Be sure to carry noise makers.
- Limit your workday so you are not out in the early morning or evening when bears are most likely to be foraging.
- All **employees** should be proficient in First Aid. Do not go out into the field without first aid training.
- All field camps should have a First Aid Kit.
- All field camps should have means of communication with local ambulance or air ambulance personnel.
- A person's best defense against bears is to avoid them. If this is not possible, then being heard, smelled, or seen may lessen your chances of surprising a bear and/or provoking an attack.
- All wildlife should be respected, avoided, and not harassed at any time.
- Cooking in remote areas should be avoided. Any food should be stored in airtight containers and all garbage should be managed appropriately: "pack it in, pack it out".
- A bear in camp or within human structures is not a chance encounter. If this bear challenges you, you must fight, scream, and do whatever is necessary to live, no matter what species the bear is!
- In general, there are two types of bear encounters: Defensive and Non-defensive for grizzly bears and black bears. Your response will vary based on your assessment of the situation (your training will help you in identifying these situations and the appropriate response).

6.0 Encounters

6.1 General Recommendations When Encountering a Bear

- Consider your surroundings and assess the situation before you act.
- Remain calm. Do not turn your back to a bear.
- DO NOT RUN – Running may trigger the bear's natural pursuit response. Bears are able to reach speeds of 25 miles per hour [40 kilometers per hour], must faster than Olympic sprinters. Bears are also excellent swimmers.

6.2 Bear Encounters in the Field

6.2.1 Your response will depend upon the type of encounter.

6.2.2 Bears are more predictable than once believed and you can determine your best course of action in a confrontation by understanding the bear's characteristics and motivation. There are two pieces of information you should be aware of in any bear encounter:

- The type of bear you are dealing with, and
- The reason for the encounter.

6.2.3 Some people believe that when you stand your ground against a predatory black bear attack, the bear will feel threatened and leave. This has been effective in some cases. HOWEVER, it is not effective against a grizzly bear predatory attack and it is very difficult to know when it will be effective against black bears. Polar bears do not follow the same behavioral patterns as grizzly and black bears; polar bears are almost always aggressive and will not back down. Special considerations must be given to projects where polar bear encounters are anticipated.

6.3 If you can leave undetected:

6.3.1 Leave the area quietly in the same direction that you came from.

6.3.2 Move while the bear's head is down. Stop moving when the bear lifts its head to check its surroundings.

6.3.3 Stay downwind so the bear will not pick up your scent.

6.3.4 When you have moved a safe distance away, you can either watch and wait until the bear leaves or make a wide detour around the bear.

6.3.5 If the bear is unaware of you and approaching, allow the bear the right of way.

6.4 If you cannot leave undetected:

6.4.1 Let the bear know that you are present by smell first; therefore move upwind so they can pick up your scent.

6.4.2 If it is possible, try to keep the bear in your sight. Watch to see if the bear leaves when it smells that a person is nearby.

6.4.3 Attempt to move out of the way without being noticed by the bear. If you cannot do this, talk loudly to let the bear know where you are.

6.5 If the bear is aware of you but in the distance:

- Remain calm.
- Continue walking slowly in the same general direction, but head away from the bear.
- DO NOT RUN.
- If the bear begins to follow you, drop your pack or some article, (not food) to distract the bear. This may distract the bear long enough for you to escape. If you drop food for the bear – you will help the bear associate food with humans and teach it that aggressive behaviour will be rewarded with food.
- If it is a grizzly following you, climb a tree if there is a large tree around. Proper escape up a tree would require sclimbing at least 33 feet (10 m), however this is applicable only to Grizzly encoutners. Black bears are excellent climbers. Tree climbing should be last resort.

6.6 If the bear is aware of you and close:

- A bear will feel threatened in a close confrontation. The bear's natural tendency will be to reduce or to remove the threat. Assist the bear by acting as non-threatening as possible.
- Do not make direct eye contact with the bear.
- Do not make any sudden moves.
- Do not run!

- The bear needs to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the bear an opportunity to leave. Be sure the bear has an open escape route. Do not corner a wild animal.
- Try to back away slowly and/or climb a tree if appropriate.
- Attempt to deter the bear if you are in a safe position.

6.7 If the bear is close and threatening:

- If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the bear is. Try to scare the bear off.
- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the bear in a calm authoritative tone of voice.
- Do not startle or provoke the bear by making sudden moves.
- Never imitate the bear's aggressive sounds, signals or posture. The bear is attempting to establish dominance and imitating its moves is a challenge to its dominance.
- Back slowly away from the bear and drop a pack or some other article in order to distract the bear momentarily.
- Remember that the bear may be defending cubs that you have not yet seen or they have a food cache nearby. Attempt to look as non-threatening as possible.

6.8 If the bear is very close and approaching:

- A distance of less than 164 feet (50 meters) in an open area and closer in a forested area.
- If the bear continues to approach, use your deterrent.
- If the bear does not respond to the deterrent you must now STAND YOUR GROUND!
- If the bear continues to approach and is acting aggressive, YOU MAY HAVE TO SHOOT if you are carrying a firearm.

6.9 If the Bear Charges:

- A bear will charge you at high speed down on all four legs and often crouched low to the ground.
- Bears do not charge when standing up on the hind legs.
- Many charges are bluffs and the bear will often stop or veer off just at the last minute. It is difficult to know if the bear is bluff charging or not until it gets very close.
- When faced with a charging bear you have two options:
    - Use your bear deterrent; or
    - Roll into a ball and cover your neck and head with your arms if you are unarmed and have no other choice.

Americas

Small Mammals

S3AM-313-ATT11

1.0 Hazard

1.1 Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against.

1.2 The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus).

1.3 Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

2.0 Personal Protective Equipment

2.1 Full-length clothing (long sleeves and pants)

2.2 Insect repellent

2.3 Respiratory equipment (when directly handling wildlife)

2.4 Gloves (when directly handling wildlife)

3.0 References

3.1 None.

4.0 Restrictions

4.1 Wildlife handling must only be completed under direct supervision of an experienced individual.

5.0 Training

5.1 Any staff that will be handling wildlife must be adequately trained and/or supervised by a wildlife biologist experienced in the job task.

6.0 Safe Work Practice

6.1 Wild animals can carry a variety of diseases that humans can contract: viral, parasitic, bacterial, and protozoal. Basic Personal Protective Equipment such as full-length clothing, gloves and a respiratory mask will greatly reduce the risk of exposure.

6.2 Treat unknown dogs encountered in field activities in the same manner as a wild animal. Be conscious of behaviors that seem to indicate anxiety (tail under the belly), defensiveness or aggressiveness, and attempt to leave the area if these are identified.

6.3 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.

6.4 Proper techniques must be employed to avoid or minimize the risk of personal injury while, at the same time, avoiding or minimizing injury to the animal.

6.5 Gloves, catch sticks, caging, and other appropriate equipment may be necessary when handling a wild animal. Most of these animals will be extremely stressed, resisting every restraint attempt.

6.6 In the unfortunate circumstance that a person is bitten or scratched, he or she should cleanse the wound thoroughly with soap and flush with water immediately, providing for a mechanical removal of potentially infective organisms. This should be followed by cleansing under medical supervision and consultation with a physician to consider the potential exposure to the rabies virus.

7.0 Rabies

7.1 You will not be able to accurately determine if an animal has rabies simply by observation as traditional symptoms of rabies (foaming at the mouth, biting, etc.) do not occur in all animals nor at all stages. There are some mammals that are at a higher risk than others for the rabies virus, such as raccoons, skunks, stray cats and dogs, foxes, coyotes, rodents. and bats; however, any mammal can contract the virus.

7.2 Rabies is contracted by contact of an infected animal's saliva with an open wound – a bite or a scratch.

7.3 Symptoms of rabies in humans usually do not present themselves for a minimum of 10 days to a year or longer (the average is 30 to 50 days). Symptoms are typical of a flu, including malaise, loss of appetite, fatigue, headache, and fever. Over half of all patients have pain (sometimes itching) or numbness at the site of exposure. They may complain of insomnia or depression. Two to ten days later, signs of nervous system damage appear; these include hyperactivity and hypersensitivity, disorientation, hallucinations, seizures, and paralysis.

7.4 Because rabies is so difficult to detect and positively identify, it is very important to consult a physician immediately. If rabies is a possibility, begin treatment with the rabies vaccine as soon as possible (unlike other vaccines, rabies vaccination begins after exposure because the virus takes a comparatively long time to induce disease).

8.0 Hantavirus

8.1 Rodents can carry a variety of diseases; of notable concern is the North American hantavirus which can cause Hantavirus Pulmonary Syndrome (HPS).

8.2 A common host of the hantavirus is deer mouse and related species (*Peromyscus* spp.), which are common throughout much of North America.

8.3 Although infection is rare, it can be fatal and, therefore, it is necessary that risk of exposure be minimized. Infection can be spread to humans when they:

8.3.1 Breathe air contaminated by deer mouse saliva, urine or feces containing infectious hantaviruses; or

8.3.2 Accidentally rub eyes, mouth or broken skin with hantavirus-infected deer mouse saliva, urine or feces.

8.4 The following precautions will be taken for all field operations:

8.4.1 Limit exposure to soils handling and use gloves where appropriate.

8.4.2 Wash or sanitize hands often throughout the day and before meals.

8.4.3 Equipment bags, storage areas, and vehicles will be inspected daily for signs of deer mouse infestation.

8.4.4 Rodent-proof storage containers will be used when practical.

8.4.5 Do not enter buildings infested with deer mice without adequate respiratory protection.

8.4.6 Droppings should never be removed by vacuuming or sweeping. Wetting down an area with a mixture of 1:9 household bleach and water solution will reduce risk of airborne exposure.

8.5 If flu-like symptoms develop three days to six weeks after exposure to rodents, a doctor should be contacted immediately (mechanical ventilation is the primary method of treatment).

9.0 Bubonic Plague

9.1 The bacteria that cause plague, *Yersinia pestis*, maintain their existence in a cycle involving rodents and their fleas.

9.1.1 In urban areas or places with dense rat infestations, the plague bacteria can cycle between rats and their fleas.

9.1.2 Humans may contract the plague bacteria through:

- Infected flea bites.
- Contact with contaminated fluid or tissue of a plague infected animal.
- Infectious droplets from an infected person coughing into the air (very uncommon in the United States, but relatively frequent in developing countries.

9.1.3 Individuals infected develop sudden onset of fever, headache, chills, and weakness and one or more swollen, tender and painful lymph nodes (called buboes).

9.1.4 Immediate medical attention is necessary to prevent complications or death.

9.1.5 Rodent control measures should be employed at AECOM locations.

9.1.6 Wear gloves if handling potentially infected animals to prevent contact between skin and the plague bacteria. Contact the local health department with and questions about disposal of dead animals.

9.1.7 Repellent shall be used if there is potential exposure to rodent fleas. Products containing DEET can be applied to the skin as well as clothing and products containing permethrin can be applied to clothing (always follow instructions on the label).

Americas

Snakes & Scorpions

S3AM-313-ATT12

1.0 Hazard

1.1 Snakes have the ability to inject venom. A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

2.0 Personal Protective Equipment

2.1 Long pants and shirts

2.2 Heavy gloves if staff will be handling debris or be close to the ground

2.3 Rubber boots, or boots that fully cover the foot (not sandals!) and preferably are at least 10 inches (25 centimeters) high

2.4 Snake Chaps that cover at least the shin

2.5 Personal first aid kit

3.0 Restrictions

3.1 Staff must not work alone in areas where the risk of a snake encounter is high.

4.0 Safe Work Practice

4.1 Prior to going into the field, staff should research the area and identify what species are present. Once confirmed, staff should contact local hospitals to identify which carry anti-venom and include that information into the SH&E Plan and THA.

4.2 Staff working in areas known to be inhabited by venomous snakes should take extra precautions, be able to identify the local snake species, and understand the best practices for administering first aid.

4.3 Most snakes in Canada are non-venomous; and most snake bites are not fatal, only painful. Learning to identify snake species will assist you in responding appropriately to an encounter, and will assist medical professionals in determining if antivenin needs to be administered if anyone is bit.

4.4 Most snakes are non-aggressive and will only attack if immediately threatened.

4.5 Prevention

4.5.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.

4.5.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.

4.5.3 Try as much as possible not to take a snake by surprise.

4.5.4 Stay on trails where possible, and watch where you place your hands and feet, especially when climbing or stepping over fences, large rocks, and logs, or when collecting firewood. Take care when overturning any objects on the ground when in snake country.

4.5.5 If you see a snake, give it as much room as possible. Most snakes have a strike distance that is only half the length of their body.

4.5.6 If you get very close to a rattlesnake, hold very still until it calms down and starts to move away. Then slowly move backwards until you are at least one snake-body length away.

4.6 Treatment

4.6.1 A bite from a venomous snake should be considered a major medical emergency. Emergency services should be contacted immediately and staff should follow the direction of the medical responders.

4.6.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.

4.6.3 Keep the injured body part motionless and just below heart level.

4.6.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.

4.6.5 Do not allow him to eat or drink anything.

4.6.6 If medical care is more than half an hour away, wrap a bandage a few inches above the bite, keeping it loose enough to enable blood flow (you should be able to fit a finger beneath it). Do not cut off blood flow with a tight tourniquet. Leave the bandage in place until reaching medical care.

4.6.7 Identify the snake that caused the bite to determine if it is venomous, and if antivenin needs to be administered. Do not waste time or endanger yourself trying to capture or kill it. Note the shape and color of the snake's head.

4.6.8 If you are alone and on foot, start walking slowly toward help, exerting the injured area as little as possible.

- Note that there are several species of snakes that superficially resemble rattlesnakes. Several species, including Bull, Milk, Fox, and Rat Snakes will even rattle their tails when startled.
- Massasauga Rattlesnake is recognized as a Threatened Species in Ontario and it is an offence to harass, or destroy the habitat of this species.

4.6.9 Workers in scorpion habitat have the potential to be stung.

- Scorpions usually hide during the day and are active at night. They may be hiding under rocks, wood, or anything else lying on the ground. Some species may also burrow into the ground. Most scorpions live in dry, desert areas. However, some species can be found in grasslands, forests, and inside caves.
- Scorpions are found in Southern and Southwestern United States.
- One scorpion species, the Northern Scorpion (*Paruroctonus boreus*) occurs in semi-arid areas of southern British Columbia, Alberta, and Saskatchewan. It carries a stinger on the end of its tail. The sting is painful but not life threatening unless there is an allergic reaction.
- Workers should wear longsleeves and pants. Clothing and shoes should be shaken out before putton on.
- Symptoms of a scorpion sting may include:
  - A stinging or burning sensation at the injection site (very little swelling or inflammation)
  - Convulsions
  - Staggering gait
  - Slurred speech
  - Drooling
  - Muscle twitches
  - Abdominal pain and cramps
- Scorpion stings may be painful, but most are harmless. In the United States, only the Bark Scorpion has venom that can potentially cause severe symptoms.
- Scorpions capable of lethal stings are found predominantly in Mexico and South America.
- If the is any question as to what type of scorpion caused the sting, contact medical services immediately.

5.0 Species

5.1 Venomous Snakes in Canada

Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) found around Wainfleet, Windsor, Bruce Penninsula and eastern Georgian Bay in Ontario.	 Eastern Massasauga Rattlesnake picture by Michael Redmer/Courtesy Lincoln Park Zoo
Northern Pacific Rattlesnake (*Crotalus viridis*) found primarily in Okanagan and Thompson River valleys of southern British Columbia.	
Prairie Rattlesnake (*Crotalus viridis*) found in south eastern Alberta, and south western Saskatchewan.	

5.2 Venomous snakes in the United States

Rattlesnake(*Crotalus cerastes)* found mostly concentrated in the southwestern United States, they extend north, east and south in diminishing numbers and varieties. Every contiguous state has one or more varieties of rattlesnake. The rattlesnake is found in many different biomes ranging from along the coast at sea level, the inland prairies and desert areas to the mountains at elevations of more than 10,000 feet. Species include: Sidewinder, Santa Catalina, Western,	 Western Rattlesnake

Mojave, Red Diamond, Western Diamond, Ridge Nosed, Eastern Diamondback, and Pigmy.	 Eastern Diamondback
Copperhead (*Agkistrodon contortrix*) is the most common venomous snake found in the eastern United States. It can be found in the states of Texas, Oklahoma, Kansas, Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, Illinois, Indiana, Ohio, Iowa, Pennsylvania, Maryland, New Jersey, Delaware, New York, Connecticut, and Massachusetts.	
Cottonmouths (water moccasins) (*Agkistrodon piscivorus)* found in the eastern United States from Virginia, south through the Florida peninsula and west to Arkansas, eastern and southern Oklahoma, and east and central Texas.	
Coral Snake (*Micrurus sp.)* found in the southern range of many temperate United States including North Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Arizona, and New Mexico.	 Eastern Coral Snake, *Micrurus fulvius*

Americas

Working On & Near Water

S3AM-315-PR1

1.0 Purpose and Scope

1.1 Establishes the minimum requirements and guidance for AECOM personnel assigned to projects that place them at risk of falling into water where a drowning hazard exists (e.g., more than 3 feet / 1 meter deep, fast-moving stream, water body with soft bottom creating entrapment hazard), including working ashore, near to, or over water or ice.

1.2 Employees performing tasks involving work on or under bridges, or on larger vessels, barges, or boats, who are constantly protected by guardrail systems, nets, or body harness systems are deemed to be adequately protected from the danger of drowning, and are not required to wear life jackets or buoyant work vests.

1.3 Projects conducted on a ship at sea or in port may not be required to comply with parts of this procedure provided:

- AECOM can demonstrate the hazard and related controls as identified in this procedure are adequately addressed through controls established by another controlling entity (e.g. ship owner/operator, port authority, etc.) and these are available to AECOM personnel.
- If AECOM cannot demonstrate adequate controls are in place, the related requirements of this procedure shall be met.

1.4 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **PFD** – Personal Flotation Device

2.2 **Life Jacket** – A personal flotation device that will turn over an unconscious worker in the water so their face and nose are not submerged.

2.3 **USCG** – United States Coast Guard

2.4 **Lifebuoy** – A throwable buoyant rescue ring with 90 feet (28 meters) buoyant line attached.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-208-PR1 Personal Protective Equipment

3.3 S3AM-209-PR1 Risk Assessment & Management

3.4 S3AM-333-PR1 Marine Safety & Vessel Operations

3.5 S3AM-334-PR1 Diving

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Manager

Responsible for the overall success of a project and the performance of employees engaged in project activities (with the support of Supervisors), and as follows:

- Confirm that all appropriate Safety, Health and Environment (SH&E) procedures are identified and implemented and their applicability during the planning stage of field investigation projects.

- Allocate appropriate resources to implement the required measures.
- Designate a field staff person to implement and maintain these measures, maintain related documentation, and to communicate with appropriate parties as necessary.
- Consult with the purchasing department on the appropriate vendors for rentals/leases.
- Confirm that boat/watercraft rental/leasing vendors have appropriate paperwork (licenses, insurance, maintenance records, orientations, etc.).
- Confirm that the project is properly staffed with trained employees.
- Require that at least one employee trained in cardiopulmonary resuscitation (CPR) and first aid is on site during work activities.
- Designate at least one employee on site to respond to water emergencies and, as applicable, operate the rescue boat at times when there are employees above, in, or near water.
- Develop and submit a SH&E Plan and other relevant SH&E planning documents for review and approval by the SH&E Manager.
- Develop a written section in the SH&E Plan (or equivalent document) to address worker safety, water rescue, and personnel transfer procedures as required in this standard.
- Confirm Task Hazard Assessments (THA) are completed prior to tasks commencing.

4.1.2 SH&E Manager

Responsible for providing support to the Manager and his/her designee in the evaluation of safety and health risks and the identification of applicable policies, procedures, and appropriate precautions, and as follows:

- Review all project related SH&E Plans and THAs as required.
- Provide access to safety records, including training records, for field staff.
- Provide support to Manager.

4.1.3 Supervisors

Responsible for verifying current status of applicable staff's training and equipping them for the work at hand, and as follows:

- Conduct daily safety meetings to include a review of the hazards and control measures associated with working over/near water. Refer to *S3AM-209-PR1 Risk Assessment & Management.*
- Train employees on their responsibilities, the hazards and the control measures associated with working over/near water.
- Perform SH&E inspections.
- Confirm that all safety issues and equipment deficiencies are properly corrected, and that the proper equipment is available to the field staff to safely meet the goals and quality objectives of the project.

4.1.4 Employees

Responsible for complying with the safe work practices specified in this policy and all other applicable SH&E policies or procedures and reporting all unsafe working conditions, and as follows:

- Review, contribute to, and sign the SH&E Plan prior to beginning the project and whenever new tasks or environmental changes occur.
- Review, contribute to, and sign the THA prior to initiating the associated task.
- Confirming that their SH&E training is up to date.
- Confirming daily that equipment is properly maintained and functioning.
- Confirm they wear all required Personal Protective Equipment (PPE).

4.2 General Safety Considerations

4.2.1 During project preparation, consideration shall include, but not be limited to**:**

- The location and nature of the site.
- Type of water hazard.
- Underwater hazards and structures.
- Access to the worksite and/or water body.
- Scope of work.
- Equipment to be used
- Local climate.

4.2.2 The information shall be considered when determining the appropriate controls, PPE, and level of emergency preparedness that is required. All projects working near water hazards shall have an appropriate SH&E Plan and THA prepared. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.3 PPE specified in the SH&E Plan and THA is to be worn as required, to meet the specific regulations of the work area, including as applicable, local and Federal legislation.

4.2.4 Whenever there exists the possibility of falling into water, personnel shall be attired in a USCG approved Type III or Type V PFD or Life jacket. Refer to *S3AM315-ATT1 Personal Floatation Devices*. The vest shall be properly sized for the individual and shall be secured at all times. For cold water conditions (water temperature less than 55 degrees Fahrenheit [13 degrees Celsius]), a USCG-approved Shallang/Mustang suit shall be worn to protect personnel from risks of cold water immersion.

4.2.5 For work at night, Type II, III, or V PFD should have a chemical light, or other appropriate survival light attached to facilitate rescue. All PFDs shall have reflective tape on them to facilitate visibility at night. For work in non-US areas, the PFD shall be approved by the appropriate local authority, or be approved as an International Maritime Organization (IMO)/Safety of Life at Sea (SOLAS) lifesaving device. This shall include either a Type II buoyant vest or a Type III flotation aid.

4.2.6 Swimming is prohibited, unless it is being conducted by certified divers in the completion of their assigned task, or to prevent a serious injury or loss of life in a person in a water/person overboard emergency.

4.2.7 The buddy system shall be utilized whenever there is the possibility of falling into water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks.

4.2.8 When work is performed in water where a drowning hazard exists, or on ice, at least one attendant and/or rescue boat operator will be utilized and be available to immediately respond to an emergency and/or launch the rescue boat. The attendant and/or boat operator are not to be assigned other duties beyond safety and rescue.

4.2.9 Conducting shoreline work alone should be avoided, unless constant communications is maintained between Staff and Supervisors, and prior approval by the Manager is granted.

4.2.10 Confirm a throwable lifebuoy with required rescue line attached (Type IV PFD) is available.

4.2.11 Confirm any additional equipment (e.g.,, sounding alarms, lifting gear, or rescue boat) as required by legislation is immediately available to recover an individual from the water.

- If the shortest dimension of the water body is greater than the length of line attached to the throw buoy, a skiff or boat shall be available to facilitate a rescue.
- The rescue boat shall be capable of being launched by one person, and shall be properly equipped, and the operator shall be properly qualified per *S3AM-333-PR1 Marine Safety & Vessel Operation*.
- If a rescue boat is not feasible due to site conditions (e.g., water depth), alternate rescue planning shall be provided in the safety plan.

4.3 Personal Protective Equipment (PPE)

4.3.1 PPE shall be selected based on the SH&E Plan and THA, and in accordance with the *S3AM-208-PR1 Personal Protective Equipment*.

4.3.2 The minimum PPE required for wading in water above the knees includes:

- Personal Flotation Devices or lifejackets shall be worn by all workers who are exposed to the danger of drowning in water deep enough for the lifejacket to be effective.
- All inflatable PFD or life jackets shall be approved and have documented regular inspections.
- Shallang/Mustang suits – In water temperatures below 55 degrees Fahrenheit (13 degrees Celsius) (regardless of air temperature) personnel are required to wear a USCG-approved Shallang/Mustang jacket or full-flotation suit, depending on field conditions. This requirement will replace the need for a wearable PFD as these suits (if properly maintained) will provide adequate flotation.
- Waders shall have a slip resistant sole suitable for the substrate.
- Eye protection shall be worn to reduce glare.
- Wading pole shall be used for supporting and testing the substrate before wading.

4.3.3 Confirm rescue equipment is on site that is appropriate to the situation (e.g., life buoys with 90 feet [28 meters]) of retrieval line, rescue boat, sounding device). Extra buoys shall be 200 feet (60 meters) or less from each other. During night operations, ring buoys shall have a USCG or SOLAS equivalent water light attached.

4.3.4 Confirm appropriate emergency supplies are available at the location (e.g. blankets, first aid kit).

4.3.5 Immersion suits, or survival suits as they are often called, can significantly improve survival time in cold water.

- Recognizing that hypothermia is a major factor in lives lost at sea, the USCG requires that vessels operating in offshore waters north of 32 degrees North latitude carry an immersion suit for each person aboard.
- These suits are to be used in place of a Type I PFD in an abandon ship situation.
- It is recommended that personnel familiarize themselves with their use and practice donning the suit before leaving the dock. It is recommended that personnel be able to get into an immersion suit in under a minute.
- If necessary to abandon ship, personnel, attired in an immersion suit with head covered in a hat, should enter the water slowly. If possible, keep the head out of the water.

4.3.6 Suits should be stored in a clean and dry location. Avoid stacking or compressing the suits in storage as it may result in a loss of buoyancy. Federal regulations require that immersion suits be stowed so that they are readily accessible to the individual for whom they are intended, from both the individual's normal work area and berthing area. If there is no location readily accessible to both areas, then a suit shall be stowed at each location.

4.4 Land-based water work (shoreline/bridge/pier – includes wading)

4.4.1 All shore work shall be performed in accordance with a "Buddy System".

4.4.2 If sampling near or in flowing water environments, be aware of slippery or steep banks and fast currents. If the current is fast or the water looks deeper than knee height, do not enter the water. If you must enter the water, a PFD and restraining system shall be worn and secured to the bank for your retrieval in the event of an emergency.

4.4.3 Whenever possible, positive controls in the form of fencing or barricades should be considered for long-term waterfront projects to form a security perimeter 10 feet in from the water's edge to prevent field staff from being exposed to water hazards.

4.4.4 Field staff involved in sampling contaminated sediments or surface waters or conducting shoreline surveys may require a Hepatitis A and/or tetanus vaccination depending on site conditions and are advised to consult with their Safety, Health and Environment Manager. An Occupational Safety

and Health Administration 40-hour HAZWOPER may be required for field staff working on site if warranted by the Project.

4.4.5 Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water's edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. It is suggested that workers not be permitted to access areas where these slip/fall hazards exist, especially in locations containing tidal water flow.

4.4.6 Personal Protective Equipment:

- AECOM requires that whenever there exists the possibility of falling into water, field staff shall be attired in a USCG-approved Type III or Type V work vest. This includes when working near fluid-filled tanks, ponds, lagoons, or natural waterways.
- The PFD vest shall be properly sized for the individual and shall be secured at all times. Prior to and after each use, the PFD/suit shall be inspected for defects, which may alter their strength or buoyancy. Defective units shall be discarded and replaced.
- Staff protective gear shall include long pants with adequate puncture resistance, and gloves appropriate to the hazard(s) (e.g., puncture resistant gloves such as Kevlar when sampling, picking up, or manipulating ground cover). It is recommended that field staff use a rake to move ground cover and debris and not touch these items directly by hand whenever possible.

4.5 Wading in a shallow stream or water body:

4.5.1 Chest waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the Manager.

- Chest waders may be worn in still waters in water depths up to the waist if bottom conditions are firm and well understood.
- Chest waders shall never be worn aboard a watercraft of any kind unless specifically approved by the SH&E Manager and required by the task (e.g., rubber or neoprene waders for electrofishing to protect from electric shock).

4.5.2 Always proceed upstream so that the wading team is walking into clear water (no turbidity caused by walking), there is good visibility for any debris floating downstream, and there is a reduced risk that the wading team will be pushed against debris or pushed into a deep hole by the current.

4.5.3 Wading in water deeper than knee height shall be undertaken as a two-person crew unless alternative suitable measures to control the hazard are employed. If conditions or legislation warrant a "rescue team," then an appropriately sized crew should be used, with the rescue team stationed on the shore with the appropriate rescue equipment, as per the site-specific safety plan.

4.5.4 Wading will not occur in the following circumstances:

- If the water is too turbid or too deep to see tripping hazards or deep holes.
- If it appears the bottom is composed of soft sediments where stepping in may result in sinking, or if the bottom consists of clay where slipping is likely.
- If large woody debris is abundant and will be difficult to step over or move around.
- If the water is over the waist of the shortest person on the wading teaming. This does not preclude wading in water bodies that have shallow shorelines that grade into deeper waters. By not wading over waist level there will be approximately 12 Inches (30 centimeters) of "safety distance" on the chest waders (if worn), should a member of the wading team step or slip into a deeper area.
- If there is a risk of the current pushing a member of the team downstream.
- If there is a risk of exposure to dangerous wildlife, or other hazardous conditions, unless appropriate mitigation procedures are in place.

4.6 Cold Water Operations

4.6.1 Cold water operations are defined as any situation that exposes an individual to falling into water that has a temperature of 55 degrees Fahrenheit (13 degrees Celsius) or less.

4.6.2 Sudden immersion in cold water can induce a gasping reaction and uncontrolled breathing which may cause the victim to ingest water and begin choking, experience cardiac arrest, and other physical body conditions all of which can result in a quick drowning.

4.6.3 Cold water incapacitation precedes hypothermia, making swimming and grasping for safety extremely difficult. So while death by hypothermia may occur in roughly one hour in a water temperature of 55 degrees Fahrenheit (13 degrees Celsius), incapacitation due to failing muscle function will occur in as little as 10 minutes, so regardless of your age, physical conditioning, or ability to swim – your odds of survival are greatly enhanced if you wear a life jacket.

4.6.4 AECOM requires personnel to wear a USCG-approved Shallang / Mustang suit at all times whenever there is the risk of falling into cold water. Employees working in these conditions view a training video on the physiological effects of cold water immersion found at: http://www.coldwaterbootcamp.com.

4.6.5 Consideration should be given to the use of immersion of survival suits when project work involves cold water operations.

4.6.6 Water and ambient air temperatures shall be directly measured at the start of each work shift, and no less than once daily. Shift/daily temperature records will be maintained in the site or field notes.

4.7 Working on Ice

4.7.1 Working in situations where ice exists shall be strictly limited due to the extreme hazards associated with falling through the ice cap, cold water immersion, and the logistical difficulties associated with executing a rescue.

4.7.2 Specific information and procedures for working on ice can be found in *S3AM-315-ATT2 Ice Safe Work Practices*.

4.7.3 Ice conditions (e.g., thickness, color, cracking) shall be recorded at the start of each work shift, and no less than once daily. Ice condition records will be maintained in the site or field notes. If ice conditions do not meet the criteria specified in *S3AM-315-ATT2 Ice Safe Work Practices*, then work shall not proceed until the required conditions are met.

4.7.4 Personnel working in or on ice shall be attired in a USCG-approved Shallang / Mustang survival suit and be supported by shore side personnel to assist in recovery in the event of a break through. Depending on the nature of the project, on-ice personnel should either wear a harness tethered back to shore, or push a flat bottom boat along on the ice and have the boat tethered back to shore.

4.7.5 Personnel working on ice covered waters should dramatically reduce vessel speed to avoid damaging propellers, shafts, and rudders. Personnel should be cognizant of shoreline ice which can prevent access to alternative ramps and docks that were considered as egress points in emergency planning.

4.7.6 Personnel should be wary that boat ramps on tidally influenced waters can flash freeze at low tide, precluding or compromising safe access and egress.

4.7.7 Extra safety equipment:

- Extra blankets should be kept on site (in a vehicle) when working on or near frozen water bodies.
- An ice pick, ice chisel, and/or ice auger should be used by a member of the crew with experience or training in identifying thin or weak ice.
- A braided rope, preferably 98 feet (30 meters) in length.

4.8 Emergency Response

4.8.1 Emergency preparedness applies to any work where there exists the risk of falling into water, especially moving waters, along piers, bulkheads, and river banks with a sharp drop off in bathymetry.

4.8.2 Field staff working in or alongside waters, especially moving waters, where there exists the possibility of falling in shall have an Emergency Response Plan to recover someone in the event they have fallen in.

4.8.3 A throwable rescue device (Class IV PFD) shall be immediately available in the event of an emergency situation. In these situations the position and accessibility of throw rings and other rescue devices (e.g., ladders) and the mechanism to recover a person from the water shall be considered.

4.8.4 The number and placement of ladders and throw rings shall be sufficient so that the maximum swimming distance to them is no more than 25 feet.

4.8.5 If workers have the potential to get stuck in mud or fluidized sediment, air injection equipment designed to free worker's feet/legs may need to be available on site. At a minimum, a safety line should be available to be deployed from safe ground. If a worker does get stuck, they should not struggle as this causes further sinking. Use a pole to conduct sediment probing to assess water depths, the stability of shoreline terrain, and the bearing capacity of bottom sediments ahead of the chosen path.

4.9 Training

- All Staff and Managers working on projects with exposure to open water shall receive training in their applicable tasks, the hazards, precautions, and rescue procedures associated with working in or over water, refer to the *S3AM-003-PR1 SH&E Training* program.
- All staff working on or near frozen water bodies shall complete Ice Safety Awareness training.
- Staff who will be working on frozen water bodies regularly or for extended periods of time should take an Ice Rescue Training course, or obtain management approval based on their level of experience/competence working on ice.
- Staff working near cold water shall complete awareness level training on Cold Water Immersion.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-315-ATT1 Personal Floatation Devices

6.2 S3AM-315-ATT2 Ice Safe Work Practices

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Americas

Personal Floatation Devices

S3AM-315-ATT1

1.0 Personal Flotation Devices

1.1 AECOM requires all personnel to wear a U.S. Coast Guard (USCG)- or Transport Canada (TC)-approved personal flotation device (PFD) or life jacket at all times whenever there exists the possibility of falling into water. The various types of PFDs to be considered are described below. Note: The USCG is working with the PFD community to revise the classification and labelling of PFDs to be redesigned to focus on performance criteria rather than construction standards.

1.1.1 **Type I –** Designed for extended survival in rough, open water and best for all waters, open ocean, rough seas, or remote water, where rescue may be slow coming.. This PFD has over 22 pounds of buoyancy and will usually turn an unconscious person face up in the water. It is, however, very bulky and restrictive and not well suited to working on deck; a Type III or Type V PFD is generally preferred. Regardless of this fact, all vessels working in unprotected waters are required to carry a Type I PFD for each person aboard. In the event of an abandon ship situation, all passengers are required to don their Type I PFD as this flotation device will keep you afloat in offshore waters where rescue may be slow in coming.

1.1.2 **Type II –** Designed for calm inland waters where there is a chance of a fast rescue. It is less bulky and less expensive than a Type I, and may turn an unconscious person face-up in the water.

1.1.3 **Type III** – Designed for use in calm water where there is a good chance of a fast rescue. Slightly lighter than a Type II, this PFD will generally not turn an unconscious person face-up in the water. Shallang/Mustang flotation jackets are considered in the Type III category.

1.1.4 **Type IV –** These are first response rescue devices designed to be thrown to a person overboard or person in the water. These devices include boat cushions, ring buoys, and horseshoe buoys. They are NOT designed to be worn and must be supplemented by wearable PFD. These devices need to be stowed in a location and in a manner that makes them immediately available for emergencies. Type IV devices should not be used for small children, non-swimmers, or unconscious people.

1.1.5 **Type V –** This is a special-use PFD and includes three-piece work vests, flotation deck suits for hypothermia protection (such as Shallang/Mustang suits), and hybrids for restricted use. Hybrid vests contain some internal buoyancy and are inflatable to provide additional flotation. Immersion suits for cold water survival are also classified as Type V flotation devices.

2.0 Standards

The following standards apply to lifejackets and personal flotation devices:

Association	Standard
United States Coast Guard (USCG) Standard	Lifesaving and Fire Safety Division, Commandant (CG-ENG-4); formerly CG-5214, CG-3PSE-4 and G-MSE-4: Personal Flotation Devices & Lights, Throwable PFDs (Ring Life Buoys & Buoyant Cushions).
Canadian General Standards Board (CGSB)	CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type with a minimum buoyancy of 93 N (21 lbs) CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices with a minimum buoyancy of 69 N (15.5 lbs) CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type with a minimum buoyancy of 125 N (28 lbs)

Americas

Ice Safe Work Practices

S3AM-315-ATT2

1.0 Background

1.1 There is no such thing as 100-percent safe ice; there are a number of factors detailed herein which affect the bearing capacity of ice.

1.2 New ice is usually stronger than old ice. Four inches of clear, newly-formed ice may support one person on foot, while a foot or more of old, partially-thawed ice may not. Additional bearing capacity guidelines based on ice thickness can be found at: http://www.dnr.state.mn.us/safety/ice/thickness.html

1.3 Ice seldom freezes uniformly. It may be a foot thick in one location and only an inch or two just a few feet away.

1.4 Ice formed over flowing water and currents is often dangerous. This is especially true near streams, bridges and culverts. Also, the ice on the outside of river bends is usually weaker due to the undermining effects of the faster current.

1.5 The insulating effect of snow slows down the freezing process. The extra weight also reduces how much weight the ice sheet can support. Also, ice near shore can be weaker than ice that is further out.

1.6 Booming and cracking ice isn't necessarily dangerous. It only means that the ice is expanding and contracting as the temperature changes.

1.7 Schools of fish or flocks of waterfowl can also adversely affect the relative safety of ice. The movement of fish can bring warm water up from the bottom of the lake opening holes in the ice which can cause snowmobiles and cars to break through.

1.8 Heavy snowfall early in the season may result in reduced ice thickness due to the insulating effect of the snow.

1.9 A fresh fall of snow will often cover areas that would otherwise be recognized as hazardous.

1.10 Water overflow and ponding caused by increased water levels can cover hazardous areas. Be aware of overhanging riverbanks when ascending and descending.

2.0 Safe Work Practices

2.1 If considering work on frozen waters or in the presence of shoreline ice, the following requirements shall be followed:

2.1.1 Working in situations where ice exists shall be strictly limited. The risks of cold water immersion; slippery shorelines, docks and boat ramps; and navigation hazards around ice and frozen shorelines should be avoided. Field work should be rescheduled to periods of warmer temperatures, when ice and cold water hazards are not an issue.

2.1.2 Avoid working on water immediately prior to freeze-up because of floating ice sheet hazards. Avoid working on ice prior to break-up because of ice cover instability.

2.1.3 Care should be exercised when near the following areas: tributary/stream inflows, lake narrows, beaver dams, riffle areas, industry discharges, sewage lagoons, and open water, as the ice is usually thinner in these areas. Pressure ridges should also be avoided, as there may be open leads, weak ice and/or slush ice in these areas.

2.1.4 Work shall be performed in accordance with the "Buddy System" with rescue communications available.

2.1.5 Do not walk or work on ice unless there is no other way of performing work. Whenever possible, use alternate methods. One suggestion is to have field staff push a flat-bottomed boat onto the ice.

The boat shall have a safety tether tied to it that can be handled by workers standing off the ice cover along the shore line.

2.1.6 Only walk on ice that is fully frozen, not cracked or brittle, with a thickness that will support the necessary weight of workers and associated equipment. Use supplemental traction-control footwear devices to reduce the risk of slips, trips, and falls.

2.1.7 If the ice consists of a “crust” that can be easily broken by hand, work may proceed by entering the water in accordance with all other safety procedures described in *S3AM-315-PR1 Working Over & Near Water*; however, the risk of entrapment beneath the ice still exists and work should not be conducted in any moving water, or still water that is more than waist-high.

2.1.8 If the ice thickness is such that it can’t be easily broken by hand, but is less than the requirements listed in this procedure, then work shall not proceed until one of the prior conditions is met.

2.1.9 When working on or near an ice surface, field staff should always check the ice thickness and condition thoroughly using an ice pick, ice chisel, and/or ice auger. It is virtually impossible to describe all conditions that may be encountered while working on ice cover; however, the following can be used as guidelines:

- The color of ice, which may range from blue to white to grey, provides an indication of its quality and strength.
- Clear blue ice is generally the strongest.
- White, opaque ice (snow ice) has relatively high air content and its strength depends on the density; the lower the density, the weaker the ice. High-density white ice has a strength approaching that of clear blue ice.
- Grey ice generally indicates the presence of water as a result of thawing, and shall be considered highly suspect as a load-bearing surface.

2.1.10 Ice conditions (e.g., thickness, color, cracking) and ambient air temperature shall be recorded at the start of each work shift, and no less than once daily. Ambient water temperature shall be recorded along with ice thickness observations, whenever feasible. Ice condition records shall fbe maintained in the site or field notes. If ice conditions do not meet the criteria above, then work shall not proceed until the required conditions are met.

2.1.11 When possible, conduct a reconnaissance prior to freeze-up and prior to actually working on the ice cover to become familiar with any potential hazards.

2.2 Personal Protective Equipment (PPE)

2.2.1 PPE shall be selected in accordance with the *S3AM-208-PR1 Personal Protective Equipment* and *S3AM-315-PR1 Working Over & Near Water.*

2.2.2 Workers are required to wear an approved Shallang/Mustang flotation suit in accordance with the manufacturer’s requirements.

2.2.3 Workers shall wear a restraining system (a lifeline attached to the front of a full-body harness) and stay close enough to the edge to make it possible for a shoreline attendant to pull the individual back off the ice.

2.2.4 Workers shall have available (on their person) tools that can be used to partially penetrate the ice and gain leverage to help in pulling themselves out of the water and back up onto the ice. Equipment is available with capped ends that can be worn safely until needed.

2.3 Unknown Conditions

2.3.1 The following guidelines shall be used when there is insufficient evidence to prove the ice is safe for travel and when the job task cannot be postponed:

- Select an area where the ice is of good quality and hazards are minimized.
- Establish a two-person team where one person acts as an “anchorperson” on shore and the second person, connected to the anchorperson by a braided rope, acts as the “checker”,

slowly moving out over the ice to sampling locations. (When working on a river, testing with an ice auger or ice bar shall be more frequent than on a lake due to the uncertain nature of river ice.)

- The anchorperson continually looks for hazards and signs of ice failure. (When testing the safety of an ice cover, the best method is to use an ice pick/axe.) The ice in front and to the sides should be struck a solid blow every few paces. The checker should proceed carefully outward checking the ice every few paces. Both staff should work to keep the rope from becoming snagged on ice blocks. The anchorperson should maintain their position as long as the site is deemed hazardous. If the anchorperson has to move, the checker should remain stationary until the anchor has re-established a secure position. When returning from the sample site, the checker should use the above procedure, if required.
- Crews should not be operating on ice greater than 98 feet (30 meters) (or the length of a rope) from shore without appropriate equipment and Rope/Harness Restraint and Rescue System training, unless there is sufficient evidence to prove the ice is safe for travel.

3.0 Vehicle Traffic

3.1 Vehicles operated on ice shall travel with their windows down and with their seatbelt off, and their speed should not normally exceed 9 miles per hour (mph) (15 kilometers per hour [km/hr]) (in order to avoid the effects of the hydrodynamic wave). Nor should speed be less than 1 mph (1.5 km/hr), in order to avoid the effects of a stationary load. Ice thickness should be checked frequently when travelling over long stretches of ice.

3.2 Particular care should be exercised when approaching or travelling close to shore, or over shallow water, because of severe stressing of the ice due to reflection of the generated wave.

3.3 Stationary loads should be relocated to shore as soon as feasible and not left overnight.

The following tables contain guidelines for weight loads on ice.

Table 1. Ice Strength for Continuous Travel

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
One person on foot	5.0 (2.0 in)	6.0 (2.4 in)
Group, in single file	8.0 (3.2 in)	9.0 (3.5 in)
Passenger car 2,000 (4,400 lbs)	18 (7.1 in)	21 (8.3 in)
Light truck 2,500 (5,500 lbs)	20 (7.9 in)	23 (9.1 in)
Medium truck 3,500 (7,700 lbs)	26 (10.2 in)	30 (11.8 in)
Heavy truck 7,000 (15,400 lbs)	35 (13.8 in)	41 (16.1 in)
10,000 (22,000 lbs)	38 (15.0 in)	44 (17.3 in)
25,000 (55,100 lbs)	63 (24.8 in)	73 (28.7 in)
45,000 (99,200 lbs)	80 (31.5 in)	92 (36.2 in)
70,000 (154,300 lbs)	100 (39.4 in)	115 (45.3 in)
110,000 (242,500 lbs)	123 (48.4 in)	144 (56.7 in)

Table 2. Ice Strength for Stationary Loads (more than 2 hours) and Working on Ice

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
1,000 (2,200 lbs), or less	20 (7.9 in)	23 (9.1 in)
2,000 (4,400 lbs)	30 (11.8 in)	35 (13.8 in)
4,000 (8,800 lbs)	45 (17.7 in)	52 (20.5 in)
8,000 (17,600 lbs)	60 (23.6 in)	69 (27.2 in)
25,000 (55,100 lbs)	110 (43.3 in)	127 (50.0 in)
45,000 (99,200 lbs)	150 (59.1 in)	173 (68.1 in)
70,000 (154,300 lbs)	180 (70.9 in)	207 (81.5 in)
110,000 (242,500 lbs)	230 (90.6 in)	265 (104.3 in)

4.0 Rescue

4.1 If someone falls through ice:

- Do not approach the hole.
- Call the emergency number prior to attempting a rescue.
- Throw a rope or line to the victim to pull them out.
- Get medical assistance for the victim.

4.2 If you fall through the ice:

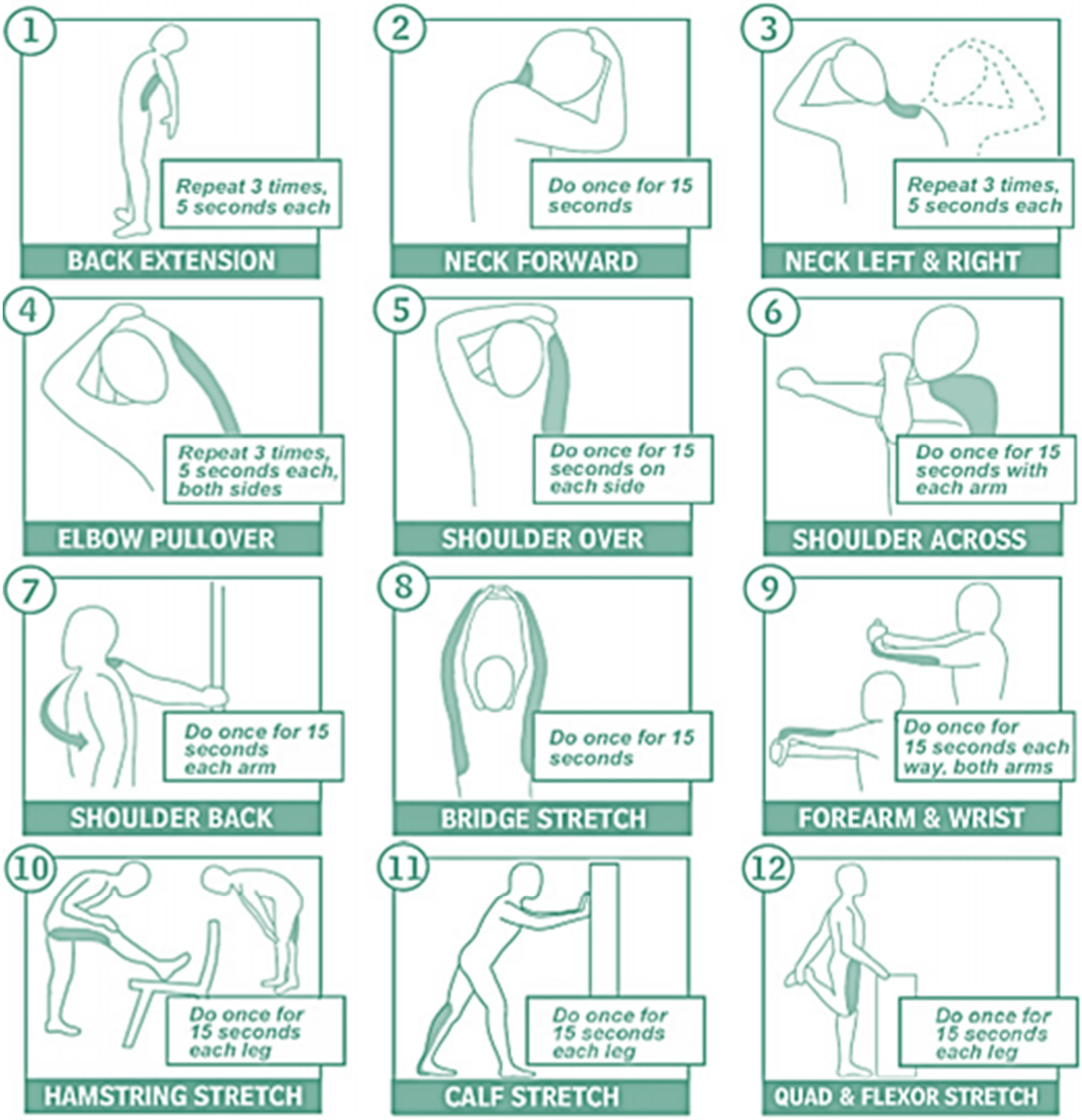
- Remain calm and look towards the shore.
- Place your hands and arms on the unbroken surface of the ice using the ice picks if available.
- Work forward by kicking your feet.
- If the ice breaks maintain your position and slide forward again.
- Once on the surface of the ice, do not stand. Instead, roll away from the hole.
- Crawl back to shore along your original path.

Attachment C

Stretch/Flex Poster

Attachment C: Stretch/Flex Poster

Examples of Stretches



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Attachment D

Site Safety Orientation

Attachment D: Site Safety Orientation

AECOM will conduct a site safety briefing for a person's initial visit to the site. The briefing will be conducted:

- Prior to the start of work;
- For any new AECOM or subconsultant personnel;
- For Site Visitors; and
- At each mobilization, or whenever there is a change in task or significant change in task location.

All personnel working on the project who have received the site briefing (including the SWP review) will sign the Personal Acknowledgement located in **Section 20**. Visitors may receive a shortened version to address the hazards specific to their visit.

The following topics, at minimum, will be discussed during the site safety briefing:

- Contents of this SWP;
- The Emergency Response Plan (Section 4);
- Contractor SHE Management expectations;
- Injury management, including notification and hospital and occupational clinic locations;
- The AECOM 4-Sight program;
- Stop Work authority;
- The THAs (**Attachment A**) for the activities that will be performed on a given job;
- Types of hazards at the site and means for minimizing exposure to them;
- Instructions for new operations to be conducted, and safe work practices;
- PPE that must be used;
- Lone worker check-in procedures;
- Emergency evacuation routes, muster points, and tornado/storm shelters; and
- Location and use of emergency equipment.
- **These briefings must be documented and maintained in the project files.**

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Attachment E

Work Plan/Client and Host Facility SH&E Requirements

Attachment E: Work Plan/Client and Host Facility SH&E Requirements

There is no Work Plan / Client and/or Host Facility SH&E requirements for this plan.

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Attachment F

Project Hazardous Materials Communication Plan

Attachment F-1: Project Hazardous Materials Communication Plan

Materials to be brought or encountered onsite will have a Safety Data Sheet (SDS) maintained in an accessible location for workers to review. Applicable SDSs are presented in **Attachment F-2**. Materials to be brought or encountered onsite will include:

- 1,4-Dioxane
- Aluminum
- Arsenic
- Benz(a)anthracene
- Benzo(b)fluoranthene
- Cobalt
- Copper
- Iron
- Lead
- Manganese
- Nickel
- Perfluorooctanoic Acid (PFOA)
- Perfluorooctane Sulfonic Acid (PFOS)
- Sodium
- Vanadium
- Zinc
- Alconox
- Hydrochloric Acid
- Hydrogen Chloride

As part of the Site Safety Lead (SSL) daily activities, an inventory of hazardous materials will be prepared with the quantities expected to be on site. The inventory will be updated if any additional materials are brought on site and as frequently as necessary to reflect accurate quantities. This chemical inventory list will be readily available for review (usually kept with the SDSs).

Unless each container has appropriate labeling, all chemical containers will be labeled with the following information:

- Product name and identity of the hazardous chemical(s).
- Appropriate hazard warnings.
- Name and address of the chemical manufacturer, importer, or other responsible party.

Labels on incoming containers of hazardous materials will not be removed or defaced. Labels are also required when a hazardous substance is transferred from a primary container to a secondary container. Labels on secondary containers must indicate the product name or the names of the hazardous substances contained therein as well as related physical and health hazards and their associated target organs. Labels may incorporate words, pictures, symbols, or combinations thereof to ensure the appropriate information is provided to the end user.

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Examples of acceptable labeling systems include the National Fire Protection Association Diamond, the Hazardous Materials Identification System, the Chemical Hazard Identification and Training system, or similar.

Employee requirements for reviewing SDSs for specific safety and health protection procedures are presented below.

- AHAs will incorporate information contained in the SDSs.
- SDS information will be followed in the use and disposal of material and selection of hazard control and emergency response measures.
- The SSL will obtain an SDS for each chemical before it is used. SDSs will generally be received by the person ordering the product. SDSs for products frequently used should be kept on file because additional copies may not be included in repeat shipments.
- The SSL will review each SDS when it is received to evaluate whether the information is complete and to determine whether existing protective measures are adequate.
- The SSL will maintain a collection of all applicable and relevant SDSs in an area that is accessible to all employees at all times. An electronic database is an acceptable method of maintaining the SDSs.
- The SSL will replace SDSs when updated sheets are received and will communicate any significant changes to those who work with the chemical.
- SDSs are required for all hazardous materials brought on site by project personnel.

General household products to be used for their specific purpose, food, drugs, and cosmetics brought into the workplace for employee use and consumption are all exempt, as are supplies in the first-aid kit, such as isopropyl alcohol and antibacterial wipes.

Employees bringing hazardous materials on to a site or project must submit SDSs to the SSL. The SSL may restrict the use of certain hazardous materials on a site or project due to occupational health risk, hazardous physical properties of the material, or potential employee sensitivity to odor or irritating properties of the material.

Other personnel working in the same area shall be provided with the following information on chemicals used by or provided to AECOM personnel:

- Names of hazardous chemicals to which they may be exposed while on the jobsite.
- Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures, such as ventilation or isolation of the work. In some cases, as an administrative control measure, a task may be delayed to a time when a minimal number of employees are present in the area.
- Location of SDSs.

As discussed in Section 5.1 of the HASP, employees will be trained initially and periodically when use of hazardous or toxic agents is altered or modified to accommodate changing on-site work procedures. Training shall cover the following topics:

- Requirements and use of the hazard communications program on the project.
- The location of all hazardous or toxic agents at the project.
- Identification and recognition of hazardous or toxic agents on the project.
- Physical and health hazards of the hazardous or toxic agents pertinent to project activities.
- Protective measures employees can implement when working with project-specific hazardous or toxic agents.

Provide training to all employees who have the potential to be exposed to hazardous materials: a) at the time of the initial task assignment, b) whenever new chemicals are introduced into the workplace, and c) more frequently where required by site-specific conditions or client-specific requirements. This training will include the following:

- Applicable regulatory requirements.

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- Location of the program, inventory, and SDS.
- Site-specific chemicals used and their hazards (chemical, physical, and health), including the general characteristics of the chemicals and signs and symptoms of exposure.
- How to detect the presence or release of chemicals including the location, types, and usage of any portable and fixed monitoring or detection equipment and their associated alarms, where applicable.
- Safe work practices (S3AM-001-PR1) and methods employees can take to protect themselves from chemical hazards (metals or explosives constituents in soil).
- How to read an SDS.
- Site- or project-specific information on hazard warnings and labels in use at the location, if applicable.
- Site-specific evacuation and rescue procedures in the event of chemical release, including the location of staging areas and personnel accounting procedures.

The following documentation will be maintained in the project file:

- Chemical inventory list;
- SDSs; and
- Training records.

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Attachment F-2: Safety Data Sheets

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SAFETY DATA SHEET

Version 6.18
Revision Date 01/02/2025
Print Date 01/03/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : 1,4-Dioxane

Product Number : 296309
Brand : Sigma-Aldrich
Index-No. : 603-024-00-5
CAS-No. : 123-91-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids : Category 2

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Eye irritation	:	Category 2A
Carcinogenicity	:	Category 1B
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system)

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements :
H225 Highly flammable liquid and vapor.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H350 May cause cancer.

Precautionary Statements :

Prevention:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing mist or vapors.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical ad-

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vice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

May form explosive peroxides.
Repeated exposure may cause skin dryness or cracking.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS-No.	Concentration (% w/w)
1,4-Dioxane	123-91-1	>= 90 - <= 100

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice : Show this material safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air. Call in physician.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact : After eye contact: rinse out with plenty of water. Call in ophthalmologist.
Remove contact lenses.

If swallowed : After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free.
Pulmonary failure possible after aspiration of vomit.
Call a physician immediately.

Most important symptoms and effects, both acute and delayed : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water Foam Carbon dioxide (CO2) Dry powder
Unsuitable extinguishing media	:	For this substance/mixture no limitations of extinguishing agents are given.
Specific hazards during fire fighting	:	Combustible. Pay attention to flashback. Vapors are heavier than air and may spread along floors. Development of hazardous combustion gases or vapours possible in the event of fire. Forms explosive mixtures with air at ambient temperatures.
Hazardous combustion products	:	Carbon oxides
Specific extinguishing methods	:	No data available
Further information	:	Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for fire-fighters	:	Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains. Risk of explosion.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on protection against fire and explosion	:	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Advice on safe handling	:	Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.
Further information on storage conditions	:	Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class	:	3, Flammable liquids
Recommended storage temperature	:	Recommended storage temperature see product label.
Further information on storage stability	:	Test for peroxide formation periodically and before distillation.
Packaging material	:	Suitable material: Mild Steel Drum

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
1,4-Dioxane	123-91-1	TWA	20 ppm	ACGIH
		TWA	25 ppm 90 mg/m3	OSHA P0
		TWA	100 ppm 360 mg/m3	OSHA Z-1
		C	1 ppm 3.6 mg/m3	NIOSH REL

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	butyl-rubber
Break through time	:	480 min
Glove thickness	:	0.7 mm
Protective index	:	Full contact
Manufacturer	:	Butoject® (KCL 898)

Material	:	Viton®
Break through time	:	120 min
Glove thickness	:	0.7 mm
Protective index	:	Splash contact
Manufacturer	:	Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Remarks : This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating

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		from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Eye protection	:	Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses
Skin and body protection	:	Flame retardant antistatic protective clothing.
Hygiene measures	:	Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid (68 °F / 20 °C, 1,013 hPa)
Color	:	colorless
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	6.0 - 8 (68 °F / 20 °C) Concentration: 500 g/l
Melting point/ range	:	50 - 54 °F / 10 - 12 °C Method: lit.
Boiling point/boiling range	:	212 - 216 °F / 100 - 102 °C Method: lit.
Flash point	:	52 °F / 11 °C (1,013 hPa) Method: closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Self-ignition	:	374.99 °F / 190.55 °C
Upper explosion limit /	:	22 %(V)

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Upper flammability limit		
Lower explosion limit / Lower flammability limit	:	2 %(V)
Vapor pressure	:	36 hPa (68 °F / 20 °C) 53 hPa (77.36 °F / 25.20 °C)
Relative vapor density	:	3.04 (Air = 1.0)
Relative density	:	1.03 (68 °F / 20 °C)
Density	:	1.034 g/cm3 (77 °F / 25 °C) Method: lit.
Solubility(ies)		
Water solubility	:	1,000 g/l completely miscible (68 °F / 20 °C)
Partition coefficient: n-octanol/water	:	log Pow: -0.42 Bioaccumulation is not expected.
Autoignition temperature	:	707 °F / 375 °C (999 - 1,010 hPa) Method: Regulation (EC) No. 440/2008, Annex, A.15 GLP: yes
Decomposition temperature	:	No data available
Viscosity		
Viscosity, dynamic	:	1.2 mPa.s (77 °F / 25 °C) 1.32 mPa.s (68 °F / 20 °C)
Viscosity, kinematic	:	1.27 mm2/s (68 °F / 20 °C) Method: OECD Test Guideline 114 GLP: yes 0.93 mm2/s (104 °F / 40 °C) Method: OECD Test Guideline 114 GLP: yes
Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	none
Surface tension	:	36.9 mN/m, 77 °F / 25 °C
Molecular weight	:	88.11 g/mol

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Particle characteristics
Particle size : No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Formation of peroxides possible.

Vapors may form explosive mixture with air.

Chemical stability : The product is chemically stable under standard ambient conditions (room temperature) .

Contains the following stabilizer(s): : butyl hydroxytoluene (BHT) (0.0025 %)

Possibility of hazardous reactions : Stable under recommended storage conditions.
Vapors may form explosive mixture with air.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

Conditions to avoid : Warming.

Moisture.

Incompatible materials : No data available

Hazardous decomposition products : Peroxides

: In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 5,150 mg/kg
(OECD Test Guideline 401)
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract, Lung edema
LD50 Dermal - Rabbit - 7,378 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 20 h
Remarks: (IUCLID)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

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Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
(OECD Test Guideline 405)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral

Result: negative
Remarks: (ECHA)

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC:	2B - Group 2B: Possibly carcinogenic to humans (1,4-Dioxane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,4-Dioxane)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation. - Respiratory system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

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Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male - Oral - 716 Days - NOAEL (No observed adverse effect level) - 9.6 mg/kg
Remarks: (ECHA)

RTECS: JG8225000
Nausea, Vomiting, Weakness, Dizziness, Vertigo, Headache, Sweating, loss of appetite, Kidney injury may occur., Liver injury may occur.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The substance has delayed effects.

After absorption:

Headache
Dizziness
Nausea
Vomiting

Absorption can result in damage to:

Liver
Kidney

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

1,4-Dioxane:

Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 1,000 mg/l End point: Immobilization Exposure time: 48 h Test Type: semi-static test Analytical monitoring: yes Method: OECD Test Guideline 202 GLP: yes

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Toxicity to algae/aquatic plants	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): > 1,000 mg/l Exposure time: 72 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201 GLP: yes
Toxicity to fish (Chronic toxicity)	:	NOEC (Pimephales promelas (fathead minnow)): > 103 mg/l End point: mortality Exposure time: 32 d Test Type: flow-through test Analytical monitoring: yes GLP: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic inverte-brates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 1,000 mg/l End point: reproduction rate Exposure time: 21 d Method: OECD Test Guideline 211

Persistence and degradability

Components:

1,4-Dioxane:

Biodegradability	:	aerobic Inoculum: activated sludge Concentration: 100 mg/l Result: Not readily biodegradable. Biodegradation: < 10 % Exposure time: 29 d Method: OECD Test Guideline 301F

Bioaccumulative potential

Components:

1,4-Dioxane:

Bioaccumulation	:	Species: Cyprinus carpio (Carp) Bioconcentration factor (BCF): 0.3 - 0.7 Temperature: 77 °F / 25 °C Concentration: 10 mg/l Method: OECD Test Guideline 305C
Partition coefficient: n-octanol/water	:	log Pow: -0.42 Remarks: Bioaccumulation is not expected.

Mobility in soil

No data available

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Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

Components:

1,4-Dioxane:

Additional ecological information	:	Forms toxic mixtures in water, dilution measures notwithstanding. Discharge into the environment must be avoided.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1165
Proper shipping name	:	Dioxane
Class	:	3
Packing group	:	II
Labels	:	Class 3 - Flammable liquids
Packing instruction (cargo aircraft)	:	364
Packing instruction (passenger aircraft)	:	353

IMDG-Code

UN number	:	UN 1165
Proper shipping name	:	DIOXANE
Class	:	3
Packing group	:	II
Labels	:	3

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EmS Code : F-E, S-D
Marine pollutant : no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National regulation

49 CFR Road

UN/ID/NA number : UN 1165
Proper shipping name : Dioxane

Class : 3
Packing group : II
Labels : Class 3 - Flammable liquids
ERG Code : 127
Marine pollutant : no

Poison Inhalation Hazard : No

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
1,4-Dioxane	123-91-1	100	100

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

1,4-Dioxane 123-91-1 >= 90 - <= 100 %

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

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The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

1,4-Dioxane	123-91-1	>= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

1,4-Dioxane	123-91-1	>= 90 - <= 100 %

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. Clean-Water Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

1,4-Dioxane	123-91-1

Pennsylvania Right To Know

1,4-Dioxane	123-91-1

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

1,4-Dioxane	123-91-1

Washington Chemicals of High Concern

1,4-Dioxane	123-91-1

California Prop. 65

WARNING: This product can expose you to chemicals including 1,4-Dioxane, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA P0	:	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA P0 / TWA	:	8-hour time weighted average
OSHA Z-1 / TWA	:	8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

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The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

Revision Date : 01/02/2025

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

US / EN

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MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	ALCONOX®
CHEMICAL FAMILY NAME:	Detergent.
PRODUCT USE:	Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER:	Not Applicable
U.N. DANGEROUS GOODS CLASS:	Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME:	Alconox, Inc.
ADDRESS:	30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-255-3924
	International calls 813-248-0585
BUSINESS PHONE:	914-948-4040
DATE OF PREPARATION:	May 2011
DATE OF LAST REVISION:	February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS



EUROPEAN and (GHS) Hazard Symbols



Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1
EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 207-638-8 Index# 011-005-00-2
EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray
P264: Wash hands thoroughly after handling
P271: Use only in well ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

Risk Phrases:
R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:
S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS: ACUTE: Eye, respiratory System, Skin CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing dificulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

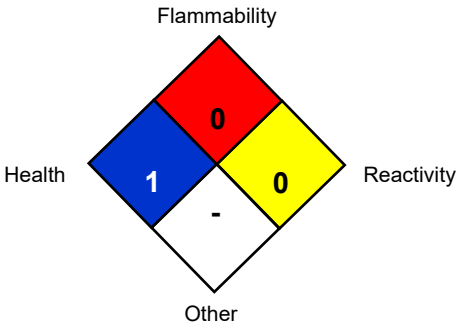
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT: Not Flammable
AUTOIGNITION TEMPERATURE: Not Applicable
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): NA Upper (UEL): NA
FIRE EXTINGUISHING MATERIALS: As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is non-flammable and has no known explosion hazards.
Explosion Sensitivity to Mechanical Impact: Not Sensitive.
Explosion Sensitivity to Static Discharge: Not Sensitive
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	1
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.
SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m³	5 mg/m³	5 mg/m³
Sodium Carbonate	497-19-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.
IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.
SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No Data available at this time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable
MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

SAFETY DATA SHEET

Version 7.0
Revision Date 09/30/2024
Print Date 10/01/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Aluminum

Product Number : 653608
Brand : Aldrich
Index-No. : 013-001-00-6
CAS-No. : 7429-90-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Pyrophoric solids (Category 1), H250
Chemicals which, in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H250	Catches fire spontaneously if exposed to air.
H261	In contact with water releases flammable gas.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P222	Do not allow contact with air.
P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P402 + P404	Store in a dry place. Store in a closed container.
P422	Store contents under inert gas.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Al
Molecular weight	:	26.98 g/mol
CAS-No.	:	7429-90-5
EC-No.	:	231-072-3
Index-No.	:	013-001-00-6

Component	Classification	Concentration
aluminium		
	Pyr. Sol. 1; 2; H250, H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture

Aluminum oxide
Combustible.
May not get in touch with: Water
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

none

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Risk of explosion. No special precautionary measures necessary.

6.3 Methods and materials for containment and cleaning up

Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Keep workplace dry. Do not allow product to come into contact with water.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Change contaminated clothing. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.
Never allow product to get in contact with water during storage.

Store under inert gas.

Storage class
Storage class (TRGS 510): 4.2: Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
aluminium	7429-90-5	TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	15 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact

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Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Risk of explosion. No special precautionary measures necessary.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 660.37 °C (1220.67 °F)
f)	Initial boiling point and boiling range	2,460 °C 4,460 °F
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	2.7 g/mL at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	No data available

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o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	Catches fire spontaneously if exposed to air.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
Sensitive to air.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Do not allow water to enter container.
Exposure to air.
Moisture.

10.5 Incompatible materials
acids, Acid chlorides, Halogens, Oxidizing agents, Bases, Oxygen

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

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Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: BD0330000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Salvelinus fontinalis - 56 d
- 268 µg/l(aluminium)

Bioconcentration factor (BCF): 36

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

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12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1396 Class: 4.3 Packing group: II
Proper shipping name: Aluminum powder, uncoated
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG

UN number: 1396 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: ALUMINIUM POWDER, UNCOATED

IATA

UN number: 1396 Class: 4.3 Packing group: II
Proper shipping name: Aluminium powder, uncoated

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Reactivity Hazard

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SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

aluminium	7429-90-5	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

aluminium	7429-90-5

Pennsylvania Right To Know

aluminium	7429-90-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Relevant changes since previous version

5. Fire-fighting measures

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 7.0 Revision Date: 09/30/2024 Print Date: 10/01/2024

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SAFETY DATA SHEET

Version 6.15
Revision Date 05/07/2025
Print Date 05/08/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X
CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity (Oral) : Category 3

Acute toxicity : Category 3

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(Inhalation)

Carcinogenicity	:	Category 1A
Reproductive toxicity	:	Category 1A
Specific target organ toxicity - repeated exposure (Oral)	:	Category 1 (Respiratory organs, Cardio-vascular system, Gastro-intestinal system, Central nervous system, Nervous system)
Short-term (acute) aquatic hazard	:	Category 1
Long-term (chronic) aquatic hazard	:	Category 1

Other hazards

None known.

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements : H301 + H331 Toxic if swallowed or if inhaled.
H350 May cause cancer.
H360 May damage fertility or the unborn child.
H372 Causes damage to organs (Respiratory organs, Cardio-vascular system, Gastro-intestinal system, Central nervous system, Nervous system) through prolonged or repeated exposure if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P301 + P310 + P330 IF SWALLOWED: Immediately call

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a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P311 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P391 Collect spillage.

Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
arsenic	7440-38-2*	>= 90 - <= 100	-

* Indicates that the identifier is a CAS No.
Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice : First aiders need to protect themselves.
Show this material safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air. Immediately call in physician.
If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact : After eye contact: rinse out with plenty of water. Call in ophthalmologist.
Remove contact lenses.

If swallowed : If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In

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exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

Most important symptoms and effects, both acute and delayed	:	The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	For this substance/mixture no limitations of extinguishing agents are given.
Specific hazards during fire fighting	:	Not combustible. Ambient fire may liberate hazardous vapours.
Hazardous combustion products	:	Arsenic oxides
Specific extinguishing methods	:	No data available
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for fire-fighters	:	Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions,	:	Advice for non-emergency personnel:

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protective equipment and emergency procedures		Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on safe handling	:	Work under hood. Do not inhale substance/mixture.
Further information on storage conditions	:	Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class	:	6.1A, Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials
Recommended storage temperature	:	Recommended storage temperature see product label.
Packaging material	:	Suitable material: Amber Glass Bottle/Jar

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
arsenic	7440-38-2	TWA	0.01 mg/m3	ACGIH
		C	0.0020 mg/m3 (Arsenic)	NIOSH REL

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Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
arsenic	7440-38-2	inorganic arsenic plus methylated metabolites (Arsenic)	Urine	End of shift	15 µg/g creatinine	ACGIH BEI
		inorganic arsenic plus methylated metabolites (Arsenic)	Urine	At the end of the work week	15 µg/g creatinine	ACGIH BEI

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when dusts are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter type P3

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Full contact
Manufacturer	:	KCL 741 Dermatril® L
Material	:	Nitrile rubber

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Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Splash contact
Manufacturer	:	KCL 741 Dermatril® L
Remarks	:	This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Eye protection	:	Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses
Skin and body protection	:	protective clothing
Hygiene measures	:	Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	powder
Color	:	gray
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point/ range	:	1503 °F / 817 °C Method: lit.
Boiling point/boiling range	:	1135 °F / 613 °C Method: lit.
Flash point	:	Not applicable
Evaporation rate	:	No data available
Burning rate	:	No data available
Self-ignition	:	> 806 °F / > 430 °C

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		GLP: yes does not ignite
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	No data available
Relative vapor density	:	No data available
Relative density	:	5.6 (72.3 °F / 22.4 °C) Method: OECD Test Guideline 109 GLP: yes
Density	:	5.727 g/mL (77 °F / 25 °C) Method: lit.
Solubility(ies) Water solubility	:	ca. 0.0106 g/l slightly soluble (68 °F / 20 °C) pH: 5.9 - 6.2 Method: OECD Test Guideline 105 GLP: yes
Partition coefficient: n-octanol/water	:	Not applicable for inorganic substances
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	none
Molecular weight	:	74.92 g/mol
Particle characteristics Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

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Reactivity	:	No data available
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Exothermic reaction with: Aluminum Bromine bromates chlorates iodates Nitric acid Risk of ignition or formation of inflammable gases or vapours with: nitrates Alkali metals Zinc Reducing agents Strong oxidizing agents Risk of explosion with: potassium permanganate azides halogen-halogen compounds Peroxides nitrogen trichloride
Conditions to avoid	:	Heat. Exposure to air may affect product quality. no information available
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia.
Diarrhea
(RTECS)
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

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Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli
Result: negative
Remarks: (ECHA)

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

IARC: 1 - Group 1: Carcinogenic to humans (arsenic)

NTP: Known - Known to be human carcinogen (arsenic)

OSHA: OSHA specifically regulated carcinogen (arsenic)

Reproductive toxicity
May damage fertility. Positive evidence from human epidemiological studies.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Oral - Causes damage to organs through prolonged or repeated exposure.
- Respiratory organs, Cardio-vascular system, Gastro-intestinal system, Central nervous system, Nervous system

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 104 Weeks - LOAEL (Lowest observed adverse effect level) - 100 mg/kg
Remarks: (ECHA)

RTECS: CG0525000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to arsenic and its compounds in general: they take effect as capillary and enzyme toxins. Symptoms of arsenic poisoning: acute: after inhalation, mucosal irritations with coughing, dyspnoea, pain in the thorax. Perforations within the respiratory tract are possible. After oral uptake, gastrointestinal disorders with vomiting, diarrhoea, and spasms, CNS disorders with headache, confusion, shaking fits and disturbed consciousness, cardiovascular disorders all the way to circulatory collapse. Chronic: exanthema, dermal lesions in the form of hyperkeratosis and hypermelanosis, loss of hair, conjunctivitis and polyneuropathy, impaired hepatic function, and renal damage. After accumulation in the liver, kidneys, and skin, arsenic is eliminated from the organism only slowly. Experience has shown arsenic compounds to be carcinogenic in man.

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Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

arsenic:

Toxicity to fish	:	LC50 (Oreochromis mossambicus (Mozambique tilapia)): 28.68 mg/l End point: mortality Exposure time: 96 h Test Type: static test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Bosmina longirostris (water flea)): 0.85 mg/l End point: Immobilization Exposure time: 48 h Test Type: static test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to algae/aquatic plants	:	NOEC (Macrocystis pyrifera (brown algae)): 0.04 mg/l Exposure time: 42 h Test Type: static test Analytical monitoring: yes Remarks: (ECHA)
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to fish (Chronic toxicity)	:	NOEC (Pimephales promelas (fathead minnow)): 2.13 mg/l End point: Growth inhibition Exposure time: 35 d Test Type: flow-through test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic	:	NOEC (Shrimp): 0.631 mg/l End point: mortality

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invertebrates (Chronic toxicity)		Exposure time: 51 d Test Type: flow-through test Analytical monitoring: yes Remarks: (ECHA)
M-Factor (Chronic aquatic toxicity)	:	1
Toxicity to microorganisms	:	EC50 (activated sludge): 10.6 mg/l Exposure time: 10 Days Test Type: static test Remarks: (ECHA)

Persistence and degradability

Components:

arsenic:

Biodegradability	:	Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

Bioaccumulative potential

Components:

arsenic:

Partition coefficient: n-octanol/water	:	Remarks: Not applicable for inorganic substances

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product

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itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1558
Proper shipping name	:	Arsenic
Class	:	6.1
Packing group	:	II
Labels	:	Division 6.1 - Toxic substances
Packing instruction (cargo aircraft)	:	676
Packing instruction (passenger aircraft)	:	669

IMDG-Code

UN number	:	UN 1558
Proper shipping name	:	ARSENIC
Class	:	6.1
Packing group	:	II
Labels	:	6.1
EmS Code	:	F-A, S-A
Marine pollutant	:	yes

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National regulation

49 CFR Road

UN/ID/NA number	:	UN 1558
Proper shipping name	:	Arsenic
Class	:	6.1
Packing group	:	II
Labels	:	Division 6.1 - Toxic substances
ERG Code	:	152
Marine pollutant	:	no
Poison Inhalation Hazard	:	No

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
arsenic	7440-38-2	1	1
arsenic	7440-38-2	1	1 (D004)

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

arsenic 7440-38-2 >= 90 - <= 100 %

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

arsenic 7440-38-2 >= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product contains the following toxic pollutants listed under the U.S. Clean Water Act Section 307

arsenic 7440-38-2 >= 90 - <= 100 %

This product contains the following priority pollutants related to the U.S. Clean Water Act:

arsenic 7440-38-2 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

arsenic 7440-38-2

Pennsylvania Right To Know

arsenic 7440-38-2

Maine Chemicals of High Concern

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Product does not contain any listed chemicals

Vermont Chemicals of High Concern

arsenic	7440-38-2

Washington Chemicals of High Concern

arsenic	7440-38-2

California Prop. 65

WARNING: This product can expose you to chemicals including arsenic, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	:	ACGIH - Biological Exposure Indices (BEI)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
ACGIH / TWA	:	8-hour, time-weighted average
NIOSH REL / C	:	Ceiling value not be exceeded at any time.

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed

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(Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Revision Date : 05/07/2025

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SAFETY DATA SHEET

Version 6.12
Revision Date 04/28/2025
Print Date 04/29/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Benz[*a*]anthracene

Product Number : B2209
Brand : Aldrich
Index-No. : 601-033-00-9
CAS-No. : 56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Carcinogenicity : Category 1B

Short-term (acute) : Category 1

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aquatic hazard

Long-term (chronic) aquatic hazard : Category 1

Other hazards

None known.

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements : H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P391 Collect spillage.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
Benz[a]anthracene	56-55-3*	>= 90 - <= 100	-

* Indicates that the identifier is a CAS No.

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Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice	:	Show this material safety data sheet to the doctor in attendance.
If inhaled	:	After inhalation: fresh air. Call in physician.
In case of skin contact	:	In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.
In case of eye contact	:	After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.
If swallowed	:	After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.
Most important symptoms and effects, both acute and delayed	:	The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIRE-FIGHTING MEASURES

Unsuitable extinguishing media	:	For this substance/mixture no limitations of extinguishing agents are given.
Hazardous combustion products	:	Carbon oxides Nature of decomposition products not known.
Specific extinguishing methods	:	No data available
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for fire-fighters	:	Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on safe handling	:	Work under hood. Do not inhale substance/mixture.
Further information on storage conditions	:	Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class	:	6.1C, Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects
Recommended storage temperature	:	Recommended storage temperature see product label.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

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Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Benz[a]anthracene	56-55-3	1-Hydroxypyrene	Urine	End of shift at end of workweek	2.5 µg/l	ACGIH BEI

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when dusts are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter type P3

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Full contact
Manufacturer	:	Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Splash contact
Manufacturer	:	Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Manufacturer	:	data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
Remarks	:	Handle with gloves. Gloves must be inspected prior to

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use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection	:	Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses
Skin and body protection	:	protective clothing
Hygiene measures	:	Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	solid
Color	:	No data available
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point/ range	:	315 - 318 °F / 157 - 159 °C
Boiling point/boiling range	:	819.7 °F / 437.6 °C
Flash point	:	No data available
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available

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Burning rate	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	No data available
Relative vapor density	:	No data available
Relative density	:	No data available
Density	:	No data available
Water solubility	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	No data available
Molecular weight	:	228.29 g/mol
Particle characteristics Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No data available
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	No data available

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Conditions to avoid	:	no information available
Incompatible materials	:	Strong oxidizing agents
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Benz[a]anthracene:

Toxicity to fish	:	Remarks: No data available
M-Factor (Acute aquatic toxicity)	:	10
M-Factor (Chronic aquatic toxicity)	:	10

Ecotoxicology Assessment

Acute aquatic toxicity	:	Very toxic to aquatic life.
Chronic aquatic toxicity	:	Very toxic to aquatic life with long lasting effects.

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Components:

Benz[a]anthracene:

Additional ecological information	:	Discharge into the environment must be avoided.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

The life science business of Merck KGaA, Darmstadt, Germany
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IATA-DGR

UN/ID No.	:	UN 3077
Proper shipping name	:	Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)
Class	:	9
Packing group	:	III
Labels	:	Class 9 - Miscellaneous dangerous substances and articles
Packing instruction (cargo aircraft)	:	956
Packing instruction (passenger aircraft)	:	956

IMDG-Code

UN number	:	UN 3077
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Class	:	9
Packing group	:	III
Labels	:	9
EmS Code	:	F-A, S-F
Marine pollutant	:	yes

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National regulation

49 CFR Road

Not regulated as a dangerous good

Poison Inhalation Hazard	:	No

Special precautions for user

Remarks	:	EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids. Packages smaller than or equal to 5 kg / L , not dangerous goods of Class 9

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SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)

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Benz[a]anthracene	56-55-3	10	10

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Benz[a]anthrac ene	56-55-3	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Benz[a]anthracene 56-55-3

Pennsylvania Right To Know

Benz[a]anthracene 56-55-3

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Benz[a]anthracene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : On TSCA Inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH BEI : ACGIH - Biological Exposure Indices (BEI)

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AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Revision Date : 04/28/2025

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SAFETY DATA SHEET

Version 6.11
Revision Date 08/28/2024
Print Date 08/29/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzo[*b*]fluoranthene

Product Number : 48490
Brand : Supelco
Index-No. : 601-034-00-4
CAS-No. : 205-99-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 3,4-Benzofluoranthene

Formula : $C_{20}H_{12}$
Molecular weight : 252.31 g/mol
CAS-No. : 205-99-2
EC-No. : 205-911-9
Index-No. : 601-034-00-4

Component	Classification	Concentration
Benzo[b]fluoranthene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H400, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Suspected human carcinogen		

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Benzo[b]fluoranthene	205-99-2	PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[b]fluoranthene	205-99-2	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

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Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 163 - 165 °C (325 - 329 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available

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r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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Presumed to have carcinogenic potential for humans

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benzo[b]fluoranthene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[b]fluoranthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[b]fluoranthene)
Marine pollutant : yes
Marine pollutant : no

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[b]fluoranthene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.Packages smaller than or equal to 5 kg / L , not dangerous goods of Class 9

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Benzo[b]fluoranthene	205-99-2	1	1

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

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Benzo[b]fluoranthene	205-99-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Benzo[b]fluoranthene	205-99-2

Pennsylvania Right To Know

Benzo[b]fluoranthene	205-99-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Benzo[b]fluoranthene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : Product contains substance(s) not listed on TSCA inventory.

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.11 Revision Date: 08/28/2024 Print Date: 08/29/2024

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SAFETY DATA SHEET

Creation Date 07-Mar-2018 **Revision Date** 27-Mar-2024 **Revision Number** 3

1. Identification

Product Name **Cobalt powder**

Cat No. : **41605**

CAS No 7440-48-4
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 1
Serious Eye Damage/Eye Irritation	Category 2
Respiratory Sensitization	Category 1
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1B

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Harmful if swallowed
May cause an allergic skin reaction
Causes serious eye irritation
Fatal if inhaled
May cause allergy or asthma symptoms or breathing difficulties if inhaled
Suspected of causing genetic defects
May cause cancer by inhalation
May damage fertility



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear respiratory protection
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Cobalt, powder	7440-48-4	<=100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	2	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Cobalt, powder	TWA: 0.02 mg/m³	(Vacated) TWA: 0.05 mg/m³ TWA: 0.1 mg/m³	IDLH: 20 mg/m³ TWA: 0.05 mg/m³	TWA: 0.02 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Recommended Filter type: Particulates filter conforming to EN 143.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid Powder
Appearance	No information available
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1495 °C / 2723 °F

Boiling Point/Range	2870 °C / 5198 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Co
Molecular Weight	58.93

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cobalt, powder	LD50 = 6171 mg/kg (Rat)	Not listed	10 mg/L (Rat) 1 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Cobalt, powder	7440-48-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)

	Known - Known Carcinogen *Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*
ACGIH: (American Conference of Governmental Industrial Hygienists)	*A1 - Known Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Animal Carcinogen*
Mexico - Occupational Exposure Limits - Carcinogens	*ACGIH: (American Conference of Governmental Industrial Hygienists)* *Mexico - Occupational Exposure Limits - Carcinogens* *A1 - Confirmed Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Confirmed Animal Carcinogen* *A4 - Not Classifiable as a Human Carcinogen* *A5 - Not Suspected as a Human Carcinogen*

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Cobalt, powder	Not listed	LC50: > 100 mg/L, 96h static (Brachydanio rerio)	Not listed	Not listed

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3089
Proper Shipping Name METAL POWDERS, FLAMMABLE, N.O.S.
Technical Name Cobalt, powder
Hazard Class 4.1
Packing Group II

TDG

UN-No	UN3089
Proper Shipping Name	METAL POWDER, FLAMMABLE, N.O.S.
Hazard Class	4.1
Packing Group	II

IATA

UN-No	UN3089
Proper Shipping Name	METAL POWDER, FLAMMABLE, N.O.S.
Hazard Class	4.1
Packing Group	II

IMDG/IMO

UN-No	UN3089
Proper Shipping Name	METAL POWDER, FLAMMABLE, N.O.S.
Hazard Class	4.1
Packing Group	II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Cobalt, powder	7440-48-4	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Cobalt, powder	7440-48-4	X	-	231-158-0	X	X		X	X	KE-06060

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Cobalt, powder	7440-48-4	<=100	0.1 %	-

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Cobalt, powder	7440-48-4	Carcinogen	-	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Cobalt, powder	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Cobalt, powder	7440-48-4	-	Use restricted. See item 30. (see link for restriction details) Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)

Cobalt, powder	7440-48-4	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Cobalt, powder	7440-48-4	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Health, Safety and Environmental Department
Email: chem.techinfo@thermofisher.com
www.thermofisher.com

Creation Date 07-Mar-2018
Revision Date 27-Mar-2024
Print Date 27-Mar-2024
Revision Summary New emergency telephone response service provider.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.9
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Copper

Product Number : 349178
Brand : Aldrich
Index-No. : 029-024-00-X
CAS-No. : 7440-50-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

No hazard pictogram, no signal word, no hazard statement(s), no precautionary statement(s) required.

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2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Cu
Molecular weight	:	63.55 g/mol
CAS-No.	:	7440-50-8
EC-No.	:	231-159-6
Index-No.	:	029-024-00-X

Component	Classification	Concentration
Copper(bulk)		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

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5.2 Special hazards arising from the substance or mixture

Copper oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Store under inert gas. Air sensitive.

Storage class
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper(bulk)	7440-50-8	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm

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Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Respiratory protection
Recommended Filter type: Filter type P2
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 1,083.4 °C (1,982.1 °F) - lit.
f)	Initial boiling point and boiling range	2,567 °C 4,653 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	8.94 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition	No data available

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	temperature	
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Ethylene oxide
Fluorine
hydrogen sulphide
halogen-halogen compounds
alkali oxides
nitrides
Salts of hydrazine
Sulfuric acid
Risk of ignition or formation of inflammable gases or vapours with:
Oxidizing agents
Chlorine
Risk of explosion with:
Acetylene
azides
ammonium compounds
iodates
bromopropine
perchlorates
bromates
picrates
chlorates
Peroxides

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

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10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: GL5325000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

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SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

Copper(bulk) 7440-50-8

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.9 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Hydrochloric Acid, 31 – 36%

Product Name: Hydrochloric Acid, 31 – 36.7%

Identified Uses: acid etching, steel pickling, oil and gas, ore and mineral, food processing, pharmaceutical, organic chemical synthesis

Company Information:
ASHTA Chemicals Inc.
P.O. Box 858
Ashtabula Ohio 44005
Phone: (440) 997-5221
Fax: (440) 998-0286
24-hour Emergency Phone: CHEMTREC: (800) 424-9300

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

GHS label elements, including precautionary statements:

Signal Word: **Danger**

Pictogram(s):



Hazard Statements	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Precautionary Statements	
P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water. Shower.

P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container with a resistant inner liner.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:

CHEMICAL NAME:	Hydrochloric acid
TRADE NAME:	Hydrochloric acid, 31 – 36%
SYNONYMS:	Muriatic acid, Chlorohydric acid, Hydrogen Chloride
C.A.S:	7647-01-0
EC:	231-595-7
WHMIS:	D2A, E
CHEMICAL FORMULA:	HCl (in aqueous solution)
CHEMICAL FAMILY:	Inorganic Acid

SECTION 4 FIRST AID MEASURES

Description of first aid measures:
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give humidified air. Give oxygen, but only by a certified physician. Consult a physician.

In case of skin contact
Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Remove contact lenses if present and easy to do. Continue rinsing eyes during transport to medical facility.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth thoroughly with water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Consult a physician.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point (Method):	Non-combustible.
Extinguishing Media:	Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.
Auto Ignition Temp:	Non-combustible.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and full protective clothing. In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials.
Unusual Fire/Explosion Hazards:	Releases flammable hydrogen gas when reacting with metals.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Environmental Precautions:
Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Avoid discharge into drains, water courses or onto the ground.

Containment and Cleaning:
Follow preplanned emergency procedures. Only properly equipped, trained, functional personnel should attempt to contain a leak. All other personnel should be evacuated from the danger area. Using full protective equipment, apply appropriate emergency device or other securement technology to stop the leak if possible.

Small Spill:	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: neutralize the residue with a dilute solution of sodium carbonate.
Large Spill:	Corrosive liquid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to knock down vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that vapor is not present at a concentration level above TLV.

SECTION 7: HANDLING AND STORAGE

Precautions to be taken for handling and storage:
Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Observe good industrial hygiene practices. Do not empty into drains. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. Store in a well-ventilated place. Store away from incompatible materials. Store closed containers in a clean, cool, open or well ventilated area. Keep out of sun.

SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

Principal Component: Hydrochloric Acid
Occupational Exposure Limits:
Regulatory Limits:

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrochloric Acid Mixture	---	---	5 ppm 7.59 mg/m^3

ACGIH TLV = 5 ppm (7.59 mg/m^3) TWA

NIOSH IDLH = 50 ppm (as HCl, 2010)

Exposure Controls:

Eye Protection: Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Other Protection: Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Ventilation Recommended: Exhaust ventilation is required to meet PEL limits.

Glove Type Recommended: Wear neoprene, nitrile, butyl rubber or PVC gloves to prevent exposure.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance	Colorless to light yellow liquid
Odor	Pungent (irritating/strong)
Odor Threshold	0.3ppm (can cause olfactory fatigue)
pH	<1 (in aqueous solution)
Melting point/freezing point	-30°C (-22°F)
Initial boiling point	>100°C (>212°F)
Flash point	Not applicable
Auto-ignition Temp	Not applicable
Evaporation rate	No data available

Decomposition temperature	No data available
Flammability (solid, gas)	Not combustible
Upper/lower flammability or explosive limits	Not combustible
Water solubility	100%
Molecular Weight	36.46
Relative Density (Specific Gravity)	1.16 (32% HCl solution) 1.19 (36.5% HCl solution)
Bulk Density	8.75 lbs/gal (32% HCl solution) 9.83 lbs/gal (36.5% HCl solution)
Vapor Density (air = 1)	1.267 at 20 °C
Vapor Pressure	84 mm Hg @ 20°C
Partition Coefficient: n-octanol/water	No data available

SECTION 10: STABILITY AND REACTIVITY

Stability: Hydrochloric acid is stable under normal conditions and pressures.

Conditions to avoid: Incompatible materials, metals, excess heat, bases.

Incompatibility: Bases, amines, metals, permanganates, (e.g. potassium permanganate), fluorine, metal acetylides, hexalithium disilicide.

Hazardous decomposition products: Hydrogen chloride, chlorine, hydrogen gas.

Polymerization: Hazardous polymerization WILL NOT occur.

SECTION 11: TOXICOGICAL INFORMATION

Information on likely routes of exposure:

Inhalation: Vapors and mist will irritate throat and respiratory system and cause coughing.

Skin contact: Causes skin burns.

Eye contact: Causes eye burns.

Ingestion: Harmful if swallowed. Causes digestive tract burns. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

Symptoms related to the physical, chemical and toxicological characteristics:

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects:

Acute toxicity: Harmful if swallowed.

Skin corrosion/irritation: Causes severe skin burns and eye damage.

Serious eye damage/eye Irritation: Causes serious eye damage.

Respiratory sensitization: Not available.

Skin sensitization:	No data available.
Germ cell mutagenicity:	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity:	This product is not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive toxicity:	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure:	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure:	No data available.
Aspiration hazard:	Not available.
Chronic effects:	Prolonged inhalation may be harmful.

Components Species Test Results:
Hydrochloric acid (CAS# 7647-01-0)

Rat - Inhalation LC_{50}:	3124 ppm, (1 hour)
Rabbit - Dermal LD_{50}:	5010 mg/kg

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Because of the low pH of this product, it would be expected produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Aquatic Toxicity:	This material is toxic to fish and aquatic organisms. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.
Fish Toxicity:	Fish LC_{50} Mosquito fish: 282 mg/l, 96 hours Fish LC_{50} Bluegill: 3.6 mg/l, 48 hours
Persistence and degradability:	Not biodegradable. Hydrochloric acid will likely be neutralized to chloride by alkalinity present in natural environment..
Bioaccumulative Potential:	No data available.
Mobility in soil:	Hydrochloric acid will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will then neutralize.
Other adverse effects:	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation

SECTION 13: DISPOSAL CONSIDERATIONS

Collect and reclaim or dispose in sealed containers at a properly licensed waste disposal site. This material , if not neutralized, must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national or international regulations.

SECTION 14: TRANSPORT INFORMATION

Shipping:

Usual Shipping Containers:	Tank cars, bulk tankers.
Usual Shelf Life:	Indefinite (life of containers).
Storage/Transport Temperatures:	Ambient.

Suitable Storage:

Materials/Coatings:	Teflon, Tygon, Rubber, PVC and polypropylene materials.

D.O.T. Information:

Labeling:	Corrosive
D.O.T. Identification Number	UN 1789
D.O.T. Shipping Name:	Hydrochloric Acid
Hazard Class:	8
Packing Group:	II
Hazard Guide:	157
Placard:	UN 1789

SECTION 15 REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:
Hydrochloric Acid CAS#: 7647-01-0

SARA 311/312 Hazards
Acute health hazard, reactive hazard.

Massachusetts Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0
Pennsylvania Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0
New Jersey Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other reproductive harm.

OSHA PSM/RMP Threshold for Accidental Release:
CAS# 7647-01-0 is regulated under OSHA PSM ***only*** if anhydrous HCl.
CAS# 7647-01-0 is regulated under EPA RMP ***only*** if $\geq$ 37% HCl.

Toxic Substances Control Act (TSCA):
Hydrochloric Acid CAS#: 7647-01-0

Comprehensive Environmental Response Compensation Liability Act: (CERCLA)
Hydrochloric Acid CAS#: 7647-01-0

SECTION 16 OTHER INFORMATION

NFPA Rating:
Health hazard: 3
Fire Hazard: 0
Reactivity Hazard: 1

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Version 1.0	For the new GHS SDS Standard	Revision Date: 12/31/2014
Version 1.1	Graphics updated	Revision Date: 3/9/2015
Version 1.2	Title updated	Revision Date: 6/2/2015
Version 1.3	Section 9 changes	Revision Date: 7/30/2015
Version 1.4	Section 1, 15 changes	Revision Date: 4/15/2016

SAFETY DATA SHEET

Hydrogen Chloride

Section 1. Identification

GHS product identifier : Hydrogen Chloride

Chemical name : Hydrogen chloride

Other means of identification :

Product use : Synthetic/Analytical chemistry.

Synonym :

SDS # : 001028

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Compressed gas
ACUTE TOXICITY (inhalation) - Category 3
SKIN CORROSION/IRRITATION - Category 1
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Contains gas under pressure; may explode if heated.
Toxic if inhaled.
Causes severe skin burns and eye damage.
Causes serious eye damage.
May cause respiratory irritation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Use only outdoors or in a well-ventilated area. Avoid breathing gas. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage : Store locked up. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Hydrogen chloride

Other means of identification :

CAS number/other identifiers

CAS number : 7647-01-0

Product code : 001028

Ingredient name	%	CAS number
hydrogen chloride	100	7647-01-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Section 4. First aid measures

Eye contact : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Toxic if inhaled. May cause respiratory irritation.

Skin contact : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:, pain, watering, redness

Inhalation : Adverse symptoms may include the following:, respiratory tract irritation, coughing

Skin contact : Adverse symptoms may include the following:, pain or irritation, redness, blistering may occur

Ingestion : Adverse symptoms may include the following:, stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Section 6. Accidental release measures

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
hydrogen chloride	**ACGIH TLV (United States, 3/2015).** C: 2 ppm **NIOSH REL (United States, 10/2013).** CEIL: 7 mg/m³ CEIL: 5 ppm **OSHA PEL (United States, 2/2013).** CEIL: 7 mg/m³ CEIL: 5 ppm **OSHA PEL 1989 (United States, 3/1989).** CEIL: 7 mg/m³ CEIL: 5 ppm

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless. Yellowish.

Molecular weight : 36.46 g/mole

Molecular formula : Cl-H

Boiling/condensation point : -85°C (-121°F)

Melting/freezing point : -114°C (-173.2°F)

Critical temperature : 51.45°C (124.6°F)

Odor : Pungent.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Section 9. Physical and chemical properties

Vapor pressure : 613 (psig)

Vapor density : 1.3 (Air = 1)

Specific Volume (ft ^{3}/lb) : 10.5263

Gas Density (lb/ft ^{3}) : 0.095

Relative density : Not applicable.

Solubility : Soluble in the following materials: cold water.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : 0.25

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
hydrogen chloride	LC50 Inhalation Gas. LC50 Inhalation Gas.	Rat Rat	3124 ppm 1562 ppm	1 hours 4 hours

IDLH : 50 ppm

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
hydrogen chloride	Eyes - Mild irritant Skin - Mild irritant	Rabbit Human	- -	0.5 minutes 5 milligrams 24 hours 4 Percent	- -

Sensitization

Not available.

Mutagenicity

Not available.

Section 11. Toxicological information

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
hydrogen chloride	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
hydrogen chloride	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Toxic if inhaled. May cause respiratory irritation.

Skin contact : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:, pain, watering, redness

Inhalation : Adverse symptoms may include the following:, respiratory tract irritation, coughing

Skin contact : Adverse symptoms may include the following:, pain or irritation, redness, blistering may occur

Ingestion : Adverse symptoms may include the following:, stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Section 11. Toxicological information

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
hydrogen chloride	Acute LC50 240000 µg/l Marine water Acute LC50 282 ppm Fresh water	Crustaceans - Carcinus maenas - Adult Fish - Gambusia affinis - Adult	48 hours 96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
hydrogen chloride	0.25	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

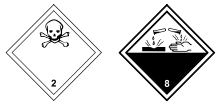
Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1050	UN1050	UN1050	UN1050	UN1050
UN proper shipping name	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS	HYDROGEN CHLORIDE, ANHYDROUS
Transport hazard class(es)	2.3 (8) 	2.3 (8) 	2.3 (8) 	2.3 (8) 	2.3 (8) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	Inhalation hazard zone C **Reportable quantity** 5000 lbs / 2270 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 3	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.40-2.42 (Class 8). **Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 25 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 38	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 0 Forbidden

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 311: Hydrogen chloride

Clean Air Act (CAA) 112 regulated toxic substances: Hydrogen chloride

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Section 15. Regulatory information

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
hydrogen chloride	100	Yes.	500	-	5000	-

SARA 304 RQ : 5000 lbs / 2270 kg

SARA 311/312

Classification : Sudden release of pressure
Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
hydrogen chloride	100	No.	Yes.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Hydrogen chloride	7647-01-0	100
Supplier notification	Hydrogen chloride	7647-01-0	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Section 15. Regulatory information

Canada

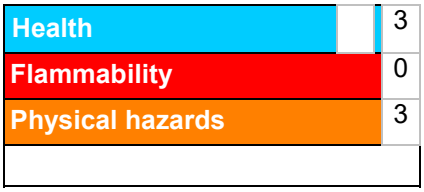
WHMIS (Canada) : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Press. Gas Comp. Gas, H280	According to package
Acute Tox. 3, H331	On basis of test data
Skin Corr. 1, H314	Expert judgment
Eye Dam. 1, H318	Expert judgment
STOT SE 3, H335	Expert judgment

History

Date of printing : 6/24/2016

Date of issue/Date of revision : 6/24/2016

Section 16. Other information

Date of previous issue : No previous validation

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Version 6.12
Revision Date 05/01/2025
Print Date 05/02/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Iron

Product Number : 12310
Brand : Aldrich
CAS-No. : 7439-89-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Self-heating chemicals : Category 1

Flammable solids : Category 1

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operates as MilliporeSigma in the US and Canada

Other hazards

None known.

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements : H228 Flammable solid.

Precautionary Statements :

Prevention:

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

No hazardous ingredients

SECTION 4. FIRST AID MEASURES

General advice : Show this material safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact : After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed : After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

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Most important symptoms and effects, both acute and delayed	:	The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Special powder against metal fire Sand Cement
Specific hazards during fire fighting	:	Combustible. Development of hazardous combustion gases or vapours possible in the event of fire.
Hazardous combustion products	:	Iron oxides
Specific extinguishing methods	:	No data available
Further information	:	Suppress (knock down) gases/vapors/mists with a water spray jet.
Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.

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Environmental precautions	:	Do not let product enter drains. Risk of explosion.
Methods and materials for containment and cleaning up	:	Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on protection against fire and explosion	:	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Further information on storage conditions	:	Tightly closed. Keep away from heat and sources of ignition.
Storage class	:	4.2, Pyrophoric and self-heating hazardous materials
Recommended storage temperature	:	Recommended storage temperature see product label.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures : No data available

Personal protective equipment

Respiratory protection	:	required when dusts are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
Recommended Filter type:	:	Filter type P1

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

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Hand protection

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Full contact
Manufacturer	:	KCL 741 Dermatril® L

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Splash contact
Manufacturer	:	KCL 741 Dermatril® L

Remarks	:	Handle with impervious gloves. This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Eye protection	:	Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses
Skin and body protection	:	Flame retardant antistatic protective clothing.
Hygiene measures	:	Change contaminated clothing. Wash hands after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	powder
Color	:	light gray
Odor	:	odorless
Odor Threshold	:	Not applicable
pH	:	Not applicable
Melting point/ range	:	2,800 °F / 1,538 °C (1,023 hPa)

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Boiling point/boiling range	:	5,182 °F / 2,861 °C (1,013 hPa)
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	The substance or mixture is a flammable solid with the category 1.
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Self-ignition	:	The substance or mixture is classified as self heating with the category 1.
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	Not applicable
Relative vapor density	:	No data available
Relative density	:	7.87 (68 °F / 20 °C)
Density	:	7.87 g/cm3 (68 °F / 20 °C)
Solubility(ies)		
Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	Not applicable for inorganic substances
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.

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Molecular weight	:	55.85 g/mol
Dust explosion class	:	St1
Particle characteristics		
Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Self-heating; may catch fire. The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Violent reactions possible with: ammonium chloride Oxidizing agents halogen-halogen compounds nitryl compounds nitrates Fluorine oils hydrogen peroxide hydrogen sulphide Acetaldehyde Generates dangerous gases or fumes in contact with: Water Acids Risk of explosion with: ammonium nitrate Ammonium peroxodisulfate potassium dichromate perchlorates Air nitrates performic acid chlorine acid oils with Water Risk of ignition or formation of inflammable gases or vapours with: Peroxides

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nitryl compounds
hydrogen sulphide
nitrogen dioxide
hydrogen peroxide
Halogens
oils
with
Air

Conditions to avoid	:	no information available
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 7,500 mg/kg
Remarks: (Lit.)
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)
Remarks: (Lit.)

Respiratory or skin sensitization
Did not cause sensitization on laboratory animals.

Germ cell mutagenicity
Test system: S. typhimurium
Method: OECD Test Guideline 471
Result: Not mutagenic in Ames Test.
Remarks: (Lit.)

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Did not show teratogenic effects in animal experiments.

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Animal testing did not show any effects on fertility.

Specific target organ toxicity - single exposure
The substance or mixture is not classified as specific target organ toxicant, single exposure.

Specific target organ toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 3178
Proper shipping name	:	Flammable solid, inorganic, n.o.s. (Iron Powder,)
Class	:	4.1
Packing group	:	III
Labels	:	Division 4.1 - Flammable solids
Packing instruction (cargo aircraft)	:	449
Packing instruction (passenger aircraft)	:	446

IMDG-Code

UN number	:	UN 3178
Proper shipping name	:	FLAMMABLE SOLID, INORGANIC, N.O.S. (Iron Powder,)
Class	:	4.1
Packing group	:	III
Labels	:	4.1
EmS Code	:	F-A, S-G
Marine pollutant	:	no

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National regulation

49 CFR Road

UN/ID/NA number	:	UN 3178
Proper shipping name	:	Flammable solid, inorganic, n.o.s. (Iron Powder,)
Class	:	4.1
Packing group	:	III
Labels	:	Division 4.1 - Flammable solids
ERG Code	:	133
Marine pollutant	:	no
Poison Inhalation Hazard	:	No

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

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SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

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No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Revision Date : 05/01/2025

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US / EN

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 6.14
Revision Date 11.03.2025
Print Date 08.07.2025
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name	:	Lead
Product Number	:	391352
Brand	:	Aldrich
Index-No.	:	082-013-00-1
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration or the annual tonnage does not require a registration.
CAS-No.	:	7439-92-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 SPRUCE ST ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone

Emergency Phone #	:	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Reproductive toxicity, (Category 1A)	H360FD: May damage fertility. May damage the unborn child.
Effects on or via lactation	H362: May cause harm to breast-fed children.
Specific target organ toxicity - repeated exposure, (Category 1), Central nervous system, Blood,	H372: Causes damage to organs through prolonged or repeated exposure if swallowed.

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Immune system, Kidney

Short-term (acute) aquatic hazard, (Category 1)	H400: Very toxic to aquatic life.
Long-term (chronic) aquatic hazard, (Category 1)	H410: Very toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram



Signal Word	Danger
Hazard Statements	
H360FD	May damage fertility. May damage the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Central nervous system, Blood, Immune system, Kidney) through prolonged or repeated exposure if swallowed.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary Statements	
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P263	Avoid contact during pregnancy and while nursing.
P264	Wash skin thoroughly after handling.
P273	Avoid release to the environment.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
Supplemental Hazard Statements	none
	Restricted to professional users. "As from 24 August 2023 adequate training is required before industrial or professional use."

Reduced Labeling (<= 125 ml)

Pictogram



Signal Word	Danger
Hazard Statements	
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H360FD	May damage fertility. May damage the unborn child.
Precautionary Statements	
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P264	Wash skin thoroughly after handling.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.

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Supplemental Hazard Statements none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Toxicological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Pb
Molecular weight : 207,20 g/mol
CAS-No. : 7439-92-1
EC-No. : 231-100-4
Index-No. : 082-013-00-1

Component	Classification	Concentration
Lead Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
CAS-No. 7439-92-1 EC-No. 231-100-4 Index-No. 082-013-00-1	Repr. 1A; Lact. ; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H360FD, H362, H372, H400, H410 Concentration limits: >= 2,5 %: Repr. 2, H361f; >= 0,5 %: STOT RE 2, H373; >= 0,03 %: Repr. 1A, H360D; M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

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In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
No special precautionary measures necessary.

6.3 Methods and materials for containment and cleaning up
Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min

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Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
Recommended Filter type: Filter type P3

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Control of environmental exposure
No special precautionary measures necessary.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Physical state	powder
b)	Color	No data available
c)	Odor	No data available
d)	Melting point/freezing point	Melting point/ range: 327,4 °C - lit.
e)	Initial boiling point and boiling range	1.740 °C - lit.
f)	Flammability (solid, gas)	No data available
g)	Upper/lower flammability or explosive limits	No data available
h)	Flash point	Not applicable
i)	Autoignition temperature	No data available
j)	Decomposition temperature	No data available
k)	pH	No data available
l)	Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: No data available

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m)	Water solubility	0,185 g/l at 20 °C at 1.013 hPa - OECD Test Guideline 105- partly soluble
n)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
o)	Vapor pressure	No data available
p)	Density	11,45 g/cm3 at 23,8 °C at 1.013 hPa - OECD Test Guideline 109
	Relative density	11,45 at 23,8 °C - OECD Test Guideline 109
q)	Relative vapor density	
r)	Particle characteristics	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
azides
picrates
ammonium nitrate
Strong oxidizing agents
Exothermic reaction with:
Fluorine
hydrogen peroxide
Generates dangerous gases or fumes in contact with:
Nitric acid

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 423)
LC50 Inhalation - Rat - male and female - 4 h - > 5,05 mg/l - dust/mist

(OECD Test Guideline 403)
LD50 Dermal - Rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity

Test Type: Micronucleus test
Species: Rat
Cell type: Red blood cells (erythrocytes)
Application Route: Oral

Result: positive
Remarks: (ECHA)

Test Type: comet assay
Species: Mouse
Cell type: Liver cells
Application Route: Inhalation

Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Oral

Result: Positive results were obtained in some in vivo tests.
Remarks: (ECHA)

Test Type: Chromosome aberration test in vitro
Species: Monkey
Cell type: lymphocyte
Application Route: Oral

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Result: Positive results were obtained in some in vivo tests.
Remarks: (ECHA)

Carcinogenicity
No data available

Reproductive toxicity
May damage the unborn child. Positive evidence from human epidemiological studies. May damage fertility. Positive evidence from human epidemiological studies. Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Oral - Causes damage to organs through prolonged or repeated exposure.
- Central nervous system, Blood, Immune system, Kidney

Aspiration hazard
No data available

11.2 Additional Information

Endocrine disrupting properties

Product:

Assessment	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

RTECS: OF7525000
anemia
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

On the basis of the morphology of the product, no hazardous properties are to be expected when it is handled and used with appropriate care.

The following applies to lead compounds in general: Due to the poor absorbability via the gastrointestinal tract, only very high doses lead to acute cases of intoxication. After a latency period of several hours, metallic taste, nausea, vomiting, and colics occur, in many instances followed by shock. Chronic uptake causes peripheral muscular weakness ("drop-wrist"), anaemia, and central-nervous disorders. Women of child-bearing age should not be exposed to the substance over longer periods of time (observe critical threshold).

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Oncorhynchus mykiss (rainbow trout) - 0,1 mg/l - 96 h Remarks: (ECHA)

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Toxicity to algae	mortality EC50 - Skeletonema costatum - 7,94 mg/l - 10 d Remarks: (ECOTOX Database) (Lead)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Cyprinodon variegatus (sheepshead minnow) - 0,23 mg/l - 28 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability — Result: - According to the results of tests of biodegradability this product is not readily biodegradable.
Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation — Oncorhynchus kisutch - 2 Weeks
- 150 µg/l(Lead)

Bioconcentration factor (BCF): 12

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

No data available

SECTION 14: Transport information

14.1 UN number

ADR/RID: 3077 IMDG: 3077 IATA: 3077

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14.2 UN proper shipping name

ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)
IATA: Environmentally hazardous substance, solid, n.o.s. (Lead)

14.3 Transport hazard class(es)

ADR/RID: 9 IMDG: 9 IATA: 9

14.4 Packaging group

ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards

ADR/RID: yes IMDG Marine pollutant: yes IATA: yes

14.6 Special precautions for user

Tunnel restriction code : (-)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Authorisations and/or restrictions on use

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	: Lead
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	: Lead
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	: Lead
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	: Lead
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	: Lead

National legislation

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards	E1	ENVIRONMENTAL HAZARDS

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involving dangerous substances.

Other regulations
Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

Take note of Dir 94/33/EC on the protection of young people at work.

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements

H360D	May damage the unborn child.
H360FD	May damage fertility. May damage the unborn child.
H361f	Suspected of damaging fertility.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.

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Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 6.11
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Manganese

Product Number : 463728
Brand : Aldrich
CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Chemicals which, in contact with water, emit flammable gases (Category 1), H260
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

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2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H260	In contact with water releases flammable gases which may ignite spontaneously.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P402 + P404	Store in a dry place. Store in a closed container.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Mn
Molecular weight	:	54.94 g/mol
CAS-No.	:	7439-96-5
EC-No.	:	231-105-1

Component	Classification	Concentration
Manganese		
	1; Aquatic Acute 2; Aquatic Chronic 2; H260, H401, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Show this material safety data sheet to the doctor in attendance.

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If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides
Combustible.
May not get in touch with: Water
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

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6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Keep workplace dry. Do not allow product to come into contact with water.

Hygiene measures

Change contaminated clothing. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Tightly closed. Keep away from heat and sources of ignition.
Never allow product to get in contact with water during storage.

Moisture sensitive.

Storage class

Storage class (TRGS 510): 4.3: Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	3 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen		

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

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Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C 3,564 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	7.3 g/mL at 25 °C (77 °F) - lit.
	Relative density	7.419 °C - Regulation (EC) No. 440/2008, Annex, A.3
n)	Water solubility	0.001 g/l at 20 °C (68 °F) - Regulation (EC) No. 440/2008, Annex, A.6 - slightly soluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances

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p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Avoid moisture.
Moisture.

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulfur oxides, Peroxides

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 420)
LC50 Inhalation - Rat - male and female - 4 h - > 5.14 mg/l - dust/mist

(OECD Test Guideline 403)
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h

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(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Human lymphocytes
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

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Aspiration hazard
No data available

11.2 Additional Information

RTECS: OO9275000
Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - > 3.6 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - > 1.6 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Desmodesmus subspicatus (green algae) - 4.5 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - 1,000 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to fish(Chronic toxicity)	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.17 - 15.61 mg/l - 28 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	static test NOEC - Ceriodaphnia dubia (water flea) - 1.7 mg/l - 8 d (OECD Test Guideline 211)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

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12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3208 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Manganese)

IATA
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

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SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Reactivity Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Manganese	7439-96-5	>= 90 - <= 100 %

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

Manganese	7439-96-5	>= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

Manganese	7439-96-5

Pennsylvania Right To Know

Manganese	7439-96-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

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No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 6.7
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Nickel

Product Number : 266981
Brand : Aldrich
Index-No. : 028-002-01-4
CAS-No. : 7440-02-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin sensitization (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Lungs, H372

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Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs (Lungs) through prolonged or repeated exposure if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-01-4

Component	Classification	Concentration
nickel powder; [particle diameter < 1 mm]		
	Skin Sens. 1; Carc. 2;	<= 100 %

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	STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H402, H412	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nickel/nickel oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

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5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Handle and store under inert gas.

Storage class
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
nickel powder; [particle diameter < 1 mm]	7440-02-0	TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not suspected as a human carcinogen		
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
nickel powder; [particle diameter < 1 mm]	7440-02-0	Nickel	5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Nickel	30 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Body Protection
protective clothing

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Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: 1,455 °C (2,651 °F)
f)	Initial boiling point and boiling range	2,730 °C 4,946 °F
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1 hPa at 1,810 °C (3,290 °F)
l)	Vapor density	No data available
m)	Density	8.9 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	No data available
q)	Decomposition	No data available

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temperature

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
acids, Oxidizing agents, Sulfur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminum, Fluorine, Ammonia

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 9,000 mg/kg
(OECD Test Guideline 401)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

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(OECD Test Guideline 405)

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available
Test Type: gene mutation test
Test system: Chinese hamster fibroblasts
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Micronucleus test
Test system: Chinese hamster fibroblasts
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 487
Result: negative

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

1 - Group 1: Carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

IARC: 2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

1 - Group 1: Carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

NTP: RAHC - Reasonably anticipated to be a human carcinogen (nickel powder; [particle diameter < 1 mm])

RAHC - Reasonably anticipated to be a human carcinogen (nickel powder; [particle diameter < 1 mm])

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.
- Lungs

Aspiration hazard
No data available

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11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 728 d - NOAEL (No observed adverse effect level) - 2.2 mg/kg - LOAEL (Lowest observed adverse effect level) - 6.7 mg/kg

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Ceriodaphnia dubia (water flea) - 0.074 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (green algae) - > 81.5 - 148 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test EC10 - Ceriodaphnia dubia (water flea) - > 2.8 - 53.6 µg/l - 7 d (US-EPA)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powders, flammable, n.o.s.
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3089 Class: 4.1 Packing group: II EMS-No: F-G, S-G
Proper shipping name: METAL POWDER, FLAMMABLE, N.O.S. (nickel powder; [particle diameter < 1 mm])
Marine pollutant : yes

IATA
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powder, flammable, n.o.s.

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

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SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

nickel powder; [particle diameter < 1 mm]	7440-02-0

Maine Chemicals of High Concern

nickel powder; [particle diameter < 1 mm]	7440-02-0

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including nickel powder; [particle diameter < 1 mm], which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 6.20
Revision Date 11/08/2024
Print Date 11/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
Index-No. : 607-704-00-2
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332

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Skin corrosion (Category 1C), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Danger

Hazard Statements

H302 + H332	Harmful if swallowed or if inhaled.
H314	Causes severe skin burns and eye damage.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

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SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Pentadecafluorooctanoic acid
Perfluorocaprylic acid
Perfluorooctanoic acid

Formula : $C_8HF_{15}O_2$
Molecular weight : 414.07 g/mol
CAS-No. : 335-67-1
EC-No. : 206-397-9
Index-No. : 607-704-00-2

Component	Classification	Concentration
pentadecafluorooctanoic acid		
	Acute Tox. 4; Skin Corr. 1C; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H314, H318, H351, H360, H362, H372	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen fluoride
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

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Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

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contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
Acid-resistant protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Color: colorless
b)	Odor	stinging
c)	Odor Threshold	No data available
d)	pH	2.6 at 1 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/ range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	0.69 hPa at 25 °C (77 °F)
l)	Vapor density	No data available

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m)	Density	1.8 g/cm3 at 20 °C (68 °F)
	Relative density	No data available
n)	Water solubility	3.4 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 6.30 - Potential bioaccumulation, (Lit.)
p)	Autoignition temperature	No data available
q)	Decomposition temperature	> 300 °C (> 572 °F) -
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents
Strong acids
Bases

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l - vapor

(Expert judgment)
Dermal: No data available

Skin corrosion/irritation
Remarks: Severe skin irritation

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Suspected of causing cancer.

IARC:	1 - Group 1: Carcinogenic to humans (pentadecafluorooctanoic acid)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.
- Liver

Aspiration hazard
No data available

11.2 Additional Information

RTECS: RH0781000
Cough, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

gastric pain

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Nausea
Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (pentadecafluorooctanoic acid)
Toxicity to algae	Remarks: No data available (pentadecafluorooctanoic acid)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	Remarks: No data available (pentadecafluorooctanoic acid)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (pentadecafluorooctanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
pentadecafluorooctanoic acid	335-67-1	1	1

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

pentadecafluorooctanoic acid 335-67-1 >= 90 - <= 100 %

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Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

pentadecafluorooctanoic acid	335-67-1

Washington Chemicals of High Concern

pentadecafluorooctanoic acid	335-67-1

California Prop. 65

WARNING: This product can expose you to chemicals including pentadecafluorooctanoic acid, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

International Regulations

Rotterdam Convention (Prior Informed Consent)	:	pentadecafluorooctanoic acid
Stockholm Convention (Persistent Organic Pollutants)	:	pentadecafluorooctanoic acid

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

pentadecafluorooctanoic acid	335-67-1	See 40 CFR § 721.10536; Proposed Rule

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The following substance(s) is/are subject to TSCA 12(b) export notification requirements:
pentadecafluorooctanoic acid 335-67-1

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.20 Revision Date: 11/08/2024 Print Date: 11/09/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 6.10
Revision Date 09/27/2024
Print Date 09/28/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Heptadecafluorooctanesulfonic acid solution

Product Number : 33607
Brand : Sigma-Aldrich
Index-No. : 603-001-00-X

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311

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Specific target organ toxicity - single exposure (Category 1), Eyes, Central nervous system, H370

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H370	Causes damage to organs (Eyes, Central nervous system).

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/ physician.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Synonyms : Perfluorooctanesulfonic acid

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Formula : C8HF17O3S
Molecular weight : 500.13 g/mol

Component		Classification	Concentration
Methanol			
CAS-No. EC-No. Index-No. Registration number	67-56-1 200-659-6 603-001-00-X 01-2119433307-44-XXXX	Flam. Liq. 2; Acute Tox. 3; STOT SE 1; H225, H301, H331, H311, H370 Concentration limits: >= 10 %: STOT SE 1, H370; 3 - < 10 %: STOT SE 2, H371;	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: fresh air. Make victim drink ethanol (e.g. 1 drinking glass of a 40% alcoholic beverage). Call a doctor immediately (mention methanol ingestion). Only in exceptional cases, if no medical care is available within one hour, induce vomiting (only in fully conscious persons) and make victim drink ethanol again (approx. 0.3 ml of a 40% alcoholic beverage/kg body weight/hour).

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

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Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage stability Recommended storage temperature
2 - 8 °C
Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Methanol	67-56-1	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Danger of cutaneous absorption		
		STEL	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Danger of cutaneous absorption		
		ST	250 ppm 325 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	200 ppm 260 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	200 ppm 260 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	200 ppm 260 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

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		C	1,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		STEL	250 ppm 325 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methanol	67-56-1	Methanol	15 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our

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customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	11 °C (52 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 36 %(V) Lower explosion limit: 6 %(V)
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available

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p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
acids, Acid chlorides, Acid anhydrides, Oxidizing agents, Alkali metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Mixture

Acute toxicity
Oral: No data available
Acute toxicity estimate Oral - 100.2 mg/kg
(Calculation method)

Inhalation: No data available

Acute toxicity estimate Inhalation - 4 h - 3.1 mg/l - vapor(Calculation method)

Dermal: No data available

Acute toxicity estimate Dermal - 300.4 mg/kg
(Calculation method)
No data available

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Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure

Remarks: No data available
Mixture causes damage to organs. - Eyes, Central nervous system

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Dizziness, Weakness, Confusion., Drowsiness, Unconsciousness, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

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Components

Methanol

Acute toxicity
Acute toxicity estimate Oral - 100.1 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Symptoms: Nausea, Vomiting
Acute toxicity estimate Inhalation - 4 h - 3.1 mg/l - vapor
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Symptoms: Irritation symptoms in the respiratory tract.
Acute toxicity estimate Dermal - 300.1 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
Remarks: (ECHA)
Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
Remarks: (ECHA)

Respiratory or skin sensitization
Sensitisation test: - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Based on available data the classification criteria are not met.
Test Type: Ames test
Test system: Salmonella typhimurium
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Result: negative
Method: OECD Test Guideline 474
Species: Mouse - male and female - Bone marrow
Result: negative

Carcinogenicity
Did not show carcinogenic effects in animal experiments.

Reproductive toxicity
Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure
Causes damage to organs. - Eyes, Central nervous system

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Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute oral toxicity - Nausea, Vomiting
Acute inhalation toxicity - Irritation symptoms in the respiratory tract.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

SECTION 12: Ecological information

12.1 Toxicity

Mixture
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

Components

Methanol

Toxicity to fish	flow-through test LC50 - Lepomis macrochirus (Bluegill) - 15,400.0 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 18,260 mg/l - 96 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - ca. 22,000.0 mg/l - 96 h (OECD Test Guideline 201)
Toxicity to bacteria	static test IC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to fish(Chronic toxicity)	NOEC - Oryzias latipes (Orange-red killifish) - 7,900 mg/l - 200 h

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Remarks: (External MSDS)

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1230 Class: 3 Packing group: II
Proper shipping name: MethanolSOLUTION

Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHANOLSOLUTION

IATA
UN number: 1230 Class: 3 (6.1) Packing group: II
Proper shipping name: MethanolSOLUTION

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Methanol	67-56-1	5000	

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 : Fire Hazard

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Hazards Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Methanol	67-56-1	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Methanol	67-56-1

Massachusetts Right To Know

Methanol	67-56-1

Pennsylvania Right To Know

Methanol	67-56-1

Pennsylvania Right To Know

Methanol	67-56-1

Maine Chemicals of High Concern

Heptadecafluorooctane-1-sulphonic acid	1763-23-1

Vermont Chemicals of High Concern

Heptadecafluorooctane-1-sulphonic acid	1763-23-1

Washington Chemicals of High Concern

Heptadecafluorooctane-1-sulphonic acid	1763-23-1

New Jersey Right To Know

Methanol	67-56-1

California Prop. 65

WARNING: This product can expose you to chemicals including Methanol, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

Heptadecafluorooctane-1-sulphonic acid	1763-23-1	See 40 CFR § 721.9582; Final Rule

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.10 Revision Date: 09/27/2024 Print Date: 09/28/2024

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SAFETY DATA SHEET

Version 6.9
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Sodium

Product Number : 483745
Brand : Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Chemicals which, in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

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2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H260	In contact with water releases flammable gases which may ignite spontaneously.
H314	Causes severe skin burns and eye damage.

Precautionary Statements

P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

SECTION 3: Composition/information on ingredients

3.1 Substances

Molecular weight : 22.99 g/mol

Component	Classification	Concentration
sodium		
	1; Skin Corr. 1B; Eye Dam. 1; H260, H314, H318	<= 100 %

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paraffin oils		
	Asp. Tox. 1; H304	>= 10 - < 20 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture
Sodium oxides
Combustible.
Vapors are heavier than air and may spread along floors.
May not get in touch with: Water
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

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5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Keep workplace dry. Do not allow product to come into contact with water.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.
Never allow product to get in contact with water during storage.
Storage stability Recommended storage temperature
2 - 30 °C
Handle and store under inert gas. Air sensitive.

Storage class

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Storage class (TRGS 510): 4.3: Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
paraffin oils	8012-95-1	TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

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Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type P2
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 97.8 °C (208.0 °F) - lit.
f)	Initial boiling point and boiling range	883 °C 1621 °F - lit.
g)	Flash point	82 °C (180 °F)
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

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j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1 hPa at 440 °C (824 °F)
l)	Vapor density	No data available
m)	Density	0.97 g/cm3
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
sensitive to moisture
Contains the following stabilizer(s):
paraffin oils (<=10010 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Do not allow water to enter container.
Strong heating.
Moisture.

10.5 Incompatible materials
Oxidizing agents

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10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, To the

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best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. (sodium)

Decomposition of the substance with tissue moisture.
(sodium)
Handle in accordance with good industrial hygiene and safety practice.
(sodium)

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1,640 mg/l - 48 h (sodium) Remarks: (ECOTOX Database)

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
Biological effects:
Harmful effect due to pH shift.
Possible decomposition products in case of hydrolyzis are:
Sodium hydroxide
Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
Reportable Quantity (RQ): 11 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: SODIUM

IATA
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
sodium	7440-23-5	10	11

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Reactivity Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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US State Regulations

Massachusetts Right To Know

sodium	7440-23-5
paraffin oils	8012-95-1

Pennsylvania Right To Know

sodium	7440-23-5
paraffin oils	8012-95-1

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.9 Revision Date: 09/07/2024 Print Date: 09/08/2024

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SAFETY DATA SHEET

Version 6.9
Revision Date 05/06/2025
Print Date 05/07/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Vanadium

Product Number : 774073
Brand : Aldrich
CAS-No. : 7440-62-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Not a hazardous substance or mixture.

Other hazards

None known.

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GHS label elements

Not a hazardous substance or mixture.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
vanadium	7440-62-2*	>= 90 - <= 100	-

* Indicates that the identifier is a CAS No.
Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

If inhaled : After inhalation: fresh air.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact : After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed : After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

Most important symptoms and effects, both acute and delayed : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

Protection of first-aiders : For personal protection see section 8.

Notes to physician : No data available

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Special powder against metal fire
Cover with dry sand or cement.

Unsuitable extinguishing media : Foam
Water

Specific hazards during fire fighting : Combustible.

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		Development of hazardous combustion gases or vapours possible in the event of fire.
Hazardous combustion products	:	Nature of decomposition products not known.
Specific extinguishing methods	:	No data available
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Avoid inhalation of dusts. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Further information on storage conditions	:	Tightly closed. Dry.
Storage class	:	13, Non Combustible Solids
Recommended storage temperature	:	Recommended storage temperature see product label.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
vanadium	7440-62-2	TWA	1 mg/m3	NIOSH REL
		ST	3 mg/m3	NIOSH REL

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when dusts are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter type P1

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Full contact
Manufacturer	:	Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Splash contact
Manufacturer	:	Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Manufacturer	:	data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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Remarks	:	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
Eye protection	:	Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses
Hygiene measures	:	Change contaminated clothing. Wash hands after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	powder
Color	:	gray
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point/ range	:	3,434 °F / 1,890 °C Method: lit.
Boiling point/boiling range	:	6,116 °F / 3,380 °C Method: lit.
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	The product is not flammable. Method: Flammability (solids)
Burning rate	:	No data available

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Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	10.67 hPa (68 °F / 20 °C)
Relative vapor density	:	No data available
Relative density	:	No data available
Density	:	6.110 g/cm3 (77 °F / 25 °C) Method: lit.
Solubility(ies) Water solubility	:	0.1 g/l slightly soluble (68 °F / 20 °C) Method: OECD Test Guideline 105 GLP: yes
Partition coefficient: n-octanol/water	:	Not applicable for inorganic substances
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	none
Molecular weight	:	50.94 g/mol
Particle characteristics Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

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Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Violent reactions possible with: halogen-halogen compounds Chlorine Alkali metals Strong oxidizing agents Water Sulphuric acid A risk of explosion and/or of toxic gas formation exists with the following substances: Air
Conditions to avoid	:	no information available
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 2,500 mg/kg
(Calculation method)
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 423)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - in vitro test
Result: No skin irritation - 15 min
(Regulation (EC) No. 440/2008, Annex, B.46)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 1 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Remarks: (in analogy to similar products)

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is

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identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 28 Days - NOAEL (No observed adverse effect level) - >= 1,000 mg/kg
Remarks: (in analogy to similar products)

RTECS: YW1355000
metallic taste, greenish-black discoloration of the tongue
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Hazardous properties cannot be excluded, but are relatively improbable due to the compound's poor water solubility.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

vanadium:

Toxicity to fish	:	LC50 (Leuciscus idus (Golden orfe)): 0.693 mg/l End point: mortality Exposure time: 96 h Test Type: semi-static test Analytical monitoring: yes Method: OECD Test Guideline 203 GLP: yes Remarks: (in analogy to similar products) The value is given in analogy to the following substances: vanadium pentoxide

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Toxicity to daphnia and other aquatic invertebrates	:	LC50 (Americamysis bahia (Mysid)): 13.3 mg/l End point: Immobilization Exposure time: 48 h Test Type: semi-static test Analytical monitoring: yes Method: US-EPA GLP: yes Remarks: (in analogy to similar products) The value is given in analogy to the following substances: sodium metavanadate (NaVO3)
Toxicity to algae/aquatic plants	:	ErC50 (Desmodesmus subspicatus (green algae)): 2.9 mg/l Exposure time: 72 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201 GLP: yes Remarks: (in analogy to similar products) The value is given in analogy to the following substances: vanadium pentoxide
Toxicity to fish (Chronic toxicity)	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 0.16 mg/l Exposure time: 28 d Remarks: (ECOTOX Database)
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 1 mg/l End point: mortality Exposure time: 14 Weeks Test Type: flow-through test Remarks: (in analogy to similar products) (ECHA) The value is given in analogy to the following substances: sodium metavanadate (NaVO3)
Toxicity to microorganisms	:	EC50 (activated sludge): > 100 mg/l Exposure time: 3 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 209 GLP: yes Remarks: (in analogy to similar products)

Ecotoxicology Assessment

Acute aquatic toxicity	:	This product has no known ecotoxicological effects.
Chronic aquatic toxicity	:	This product has no known ecotoxicological effects.

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Persistence and degradability

Components:

vanadium:

Biodegradability	:	Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

Bioaccumulative potential

Components:

vanadium:

Partition coefficient: n-octanol/water	:	Remarks: Not applicable for inorganic substances

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National regulation

49 CFR Road
Not regulated as a dangerous good

Poison Inhalation Hazard	:	No

Special precautions for user

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Remarks	:	Not classified as dangerous in the meaning of transport regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 313	:	The following components are subject to reporting levels established by SARA Title III, Section 313:

vanadium	7440-62-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

vanadium	7440-62-2

Massachusetts Right To Know

vanadium	7440-62-2

Pennsylvania Right To Know

vanadium	7440-62-2

Pennsylvania Right To Know

vanadium	7440-62-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

New Jersey Right To Know

vanadium	7440-62-2

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

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No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any

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Revision Date : 05/06/2025

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US / EN

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SAFETY DATA SHEET

Version 6.19
Revision Date 05/01/2025
Print Date 05/02/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 209988
Brand : Aldrich
Index-No. : 030-001-01-9
CAS-No. : 7440-66-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Combustible dust

Short-term (acute) : Category 1

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aquatic hazard

Long-term (chronic) aquatic hazard : Category 1

Other hazards

Combustible dust
May form explosible dust-air mixture if dispersed.

GHS label elements

Hazard pictograms :



Signal Word : Warning

Hazard Statements : May form combustible dust concentrations in air.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

P273 Avoid release to the environment.

Response:

P391 Collect spillage.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
zinc powder, zinc dust stabilized	7440-66-6*	>= 80 - <= 100	TSC
Zinc oxide	1314-13-2*	>= 3 - <= 7	TSC

* Indicates that the identifier is a CAS No.
TSC- the actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

If inhaled : After inhalation: fresh air.

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In case of skin contact	:	In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.
In case of eye contact	:	After eye contact: rinse out with plenty of water. Remove contact lenses.
If swallowed	:	After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.
Most important symptoms and effects, both acute and delayed	:	The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water Foam Carbon dioxide (CO2) Dry powder
Unsuitable extinguishing media	:	For this substance/mixture no limitations of extinguishing agents are given.
Specific hazards during fire fighting	:	Combustible. Risk of dust explosion. Development of hazardous combustion gases or vapours possible in the event of fire.
Hazardous combustion products	:	Zinc/zinc oxides
Specific extinguishing methods	:	No data available
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.

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Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Avoid inhalation of dusts. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on protection against fire and explosion	:	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Further information on storage conditions	:	Tightly closed. Dry.
Storage class	:	11, Combustible Solids
Recommended storage temperature	:	Recommended storage temperature see product label.
Further information on storage stability	:	Handle and store under inert gas. Air and moisture sensitive.
Packaging material	:	Suitable material: LDPE Bottle/Jar

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of	Control parameters /	Basis

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		exposure)	Permissible concentration	
Zinc oxide	1314-13-2	TWA (Respirable particulate matter)	2 mg/m3	ACGIH
		STEL (Respirable particulate matter)	10 mg/m3	ACGIH
		TWA (Dust)	5 mg/m3	NIOSH REL
		TWA (Fumes)	5 mg/m3	NIOSH REL
		ST (Fumes)	10 mg/m3	NIOSH REL
		C (Dust)	15 mg/m3	NIOSH REL
		TWA (Fumes)	5 mg/m3	OSHA Z-1
		TWA (total dust)	15 mg/m3	OSHA Z-1
		TWA (respirable fraction)	5 mg/m3	OSHA Z-1

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when dusts are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter type P1

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Eye protection : Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Safety glasses

Hygiene measures : Change contaminated clothing. Wash hands after working with substance.

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Dust
Color	:	dark gray
Odor	:	odorless
Odor Threshold	:	Not applicable
pH	:	Not applicable
Melting point/ range	:	788 °F / 420 °C Method: lit.
Boiling point/boiling range	:	1665 °F / 907 °C Method: lit.
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	May form combustible dust concentrations in air.
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Self-ignition	:	does not ignite
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	1.33 hPa (909 °F / 487 °C)
Relative vapor density	:	No data available
Relative density	:	6.9 (72 °F / 22 °C)
Density	:	7.133 g/cm3 (77 °F / 25 °C) Method: lit.
Solubility(ies)		
Water solubility	:	0.0001 g/l slightly soluble (68 °F / 20 °C)

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Method: OECD Test Guideline 105

Partition coefficient: n-octanol/water	:	Not applicable for inorganic substances
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity		
Viscosity, dynamic	:	> 500 mPa.s (783 °F / 417 °C)
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	none
Molecular weight	:	65.39 g/mol
Particle characteristics		
Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Contains the following stabilizer(s):	:	Zinc oxide (<=33 %)
Possibility of hazardous reactions	:	No data available
Conditions to avoid	:	no information available
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

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SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 2,500 mg/kg
(Calculation method)
LD50 Oral - Rat - male and female - > 2,000 mg/kg (zinc powder, zinc dust stabilized)
(OECD Test Guideline 401)
Acute toxicity estimate Inhalation - 4 h - 5.41 mg/l - dust/mist(Calculation method)

LC50 Inhalation - Rat - male and female - 4 h - > 5.41 mg/l - dust/mist
(zinc powder, zinc dust stabilized)
(OECD Test Guideline 403)
Acute toxicity estimate Dermal - > 5,000 mg/kg
(Calculation method)
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit (zinc powder, zinc dust stabilized)
Result: No skin irritation - 5 d
Remarks: (in analogy to similar products)
(ECHA)
The value is given in analogy to the following substances: Zinc oxide

Serious eye damage/eye irritation
Eyes - Rabbit (zinc powder, zinc dust stabilized)
Result: No eye irritation - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig (zinc powder, zinc dust stabilized)
Result: negative
(OECD Test Guideline 406)
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: Zinc oxide

Germ cell mutagenicity
Test Type: Ames test
(zinc powder, zinc dust stabilized)
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Remarks: (in analogy to similar products)
The value is given in analogy to the following substances: Zinc sulphateTest Type: In vitro mammalian cell gene mutation test
(zinc powder, zinc dust stabilized)
Test system: mouse lymphoma cells
Metabolic activation: without metabolic activation
Result: negative
Remarks: (in analogy to similar products)
(ECHA)

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The value is given in analogy to the following substances: zinc chlorideTest Type: Chromosome aberration test in vitro
(zinc powder, zinc dust stabilized)
Test system: Other cell types
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (in analogy to similar products)
(ECHA)
The value is given in analogy to the following substances: zinc chloride (zinc powder, zinc dust stabilized)
Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Intraperitoneal

Result: negative
Remarks: (in analogy to similar products)
(ECHA)
The value is given in analogy to the following substances: Zinc sulphate

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 31.52 mg/kg - LOAEL (Lowest observed adverse effect level) - 53.8 mg/kg
(zinc powder, zinc dust stabilized)
RTECS: ZG8600000
Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (zinc powder, zinc dust stabilized)
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. (zinc powder, zinc dust stabilized)

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SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

zinc powder, zinc dust stabilized:

Toxicity to fish	:	LC50 (other fish): 0.439 mg/l End point: mortality Exposure time: 96 h Test Type: flow-through test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Ceriodaphnia dubia (water flea)): 0.155 mg/l End point: Immobilization Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: US-EPA
Toxicity to algae/aquatic plants	:	NOEC (Pseudokirchneriella subcapitata (green algae)): 0.05 mg/l Exposure time: 3 d Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201 GLP: yes
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to fish (Chronic toxicity)	:	NOEC (other fish): 0.169 mg/l End point: mortality Exposure time: 30 d Test Type: flow-through test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 0.100 mg/l End point: reproduction rate Exposure time: 3 Weeks Test Type: semi-static test Analytical monitoring: yes Remarks: (ECHA)
M-Factor (Chronic aquatic toxicity)	:	1
Toxicity to microorganisms	:	NOEC (activated sludge): 0.1 mg/l Exposure time: 4 h

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Test Type: static test
Method: ISO 9509
Remarks: (in analogy to similar products)

Zinc oxide:

Toxicity to fish	:	LC50 (Danio rerio (zebra fish)): 2.525 mg/l End point: mortality Exposure time: 96 h Test Type: semi-static test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 1 mg/l End point: Immobilization Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	NOEC (Pseudokirchneriella subcapitata (microalgae)): 0.024 mg/l Exposure time: 72 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201 GLP: yes
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to fish (Chronic toxicity)	:	NOEC (Oncorhynchus mykiss (rainbow trout)): 0.2 mg/l End point: mortality Exposure time: 30 d Test Type: flow-through test Analytical monitoring: yes Method: OECD Test Guideline 215 Remarks: (in analogy to similar products) The value is given in analogy to the following substances: zinc chloride
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	EC50 (Daphnia magna (Water flea)): 0.08 mg/l End point: reproduction rate Exposure time: 21 d Test Type: semi-static test Analytical monitoring: yes Method: OECD Test Guideline 211
M-Factor (Chronic aquatic toxicity)	:	1

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Toxicity to microorganisms	:	EC50 (activated sludge): > 1,000 mg/l Exposure time: 3 h Test Type: static test Method: OECD Test Guideline 209 GLP: yes

Persistence and degradability

Components:

zinc powder, zinc dust stabilized:

Biodegradability	:	Remarks: The methods for determining the biological degradability are not applicable to inorganic substances.

Zinc oxide:

Biodegradability	:	Remarks: The methods for determining the biological degradability are not applicable to inorganic substances.

Bioaccumulative potential

Components:

zinc powder, zinc dust stabilized:

Bioaccumulation	:	Remarks: Substance is not persistent, bioaccumulative, and toxic (PBT).
Partition coefficient: n-octanol/water	:	Remarks: Not applicable for inorganic substances

Zinc oxide:

Partition coefficient: n-octanol/water	:	Remarks: Not applicable for inorganic substances

Mobility in soil

No data available

Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

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SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 3077
Proper shipping name	:	Environmentally hazardous substance, solid, n.o.s. (zinc powder, zinc dust stabilized, Zinc oxide)
Class	:	9
Packing group	:	III
Labels	:	Class 9 - Miscellaneous dangerous substances and articles
Packing instruction (cargo aircraft)	:	956
Packing instruction (passenger aircraft)	:	956

IMDG-Code

UN number	:	UN 3077
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (zinc powder, zinc dust stabilized, Zinc oxide)
Class	:	9
Packing group	:	III
Labels	:	9
EmS Code	:	F-A, S-F
Marine pollutant	:	yes

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National regulation

49 CFR Road

UN/ID/NA number	:	UN 3077
Proper shipping name	:	Environmentally hazardous substance, solid, n.o.s. (zinc powder, zinc dust stabilized, Zinc oxide)
Class	:	9
Packing group	:	III
Labels	:	Class 9 - Miscellaneous dangerous substances and articles
ERG Code	:	171
Marine pollutant	:	no

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Poison Inhalation Hazard : No

Special precautions for user

Remarks : EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
zinc powder, zinc dust stabilized	7440-66-6	1000	1030

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

zinc powder, zinc dust stabilized	7440-66-6	>= 90 - <= 100 %
Zinc oxide	1314-13-2	>= 1 - < 5 %

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

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Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product contains the following toxic pollutants listed under the U.S. Clean Water Act Section 307

zinc powder, zinc dust stabilized	7440-66-6	>= 90 - <= 100 %
Zinc oxide	1314-13-2	>= 1 - < 5 %

This product contains the following priority pollutants related to the U.S. Clean Water Act:

zinc powder, zinc dust stabilized	7440-66-6	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

zinc powder, zinc dust stabilized	7440-66-6
Zinc oxide	1314-13-2

Pennsylvania Right To Know

zinc powder, zinc dust stabilized	7440-66-6
Zinc oxide	1314-13-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:
zinc powder, zinc dust stabilized 7440-66-6

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit

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NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / TWA	:	8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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APPENDIX C

2023 Site Characterization Investigation Report by Crawford & Associates

SITE CHARACTERIZATION INVESTIGATION REPORT

Hurley Town Landfill

1035 Dug Hill Road
Town of Hurley, New York

July 2023

C&A #5447.0



IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON TO ALTER THESE PLANS, SPECIFICATIONS, OR REPORTS IN ANY WAY, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER.

I Donna Menard-Verna certify that I am currently a NYS registered professional Engineer as defined in 6NYCRR Part 375 and that this Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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Report History

Rev #	Date	Prepared By	Checked By	Approved By	Description
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I. Introduction

A. Site Description

The Hurley Town Landfill is a 10.8-acre site (tax parcel id# 47.1-3-15) located approximately 0.6 miles south of the Ashokan Reservoir in the Town of Hurley in Ulster County at 1035 Dug Hill Road. There is an approximately 5-acre closed landfill footprint which encompasses a portion of the site. The Town additionally owns the adjacent property to the west. The landfill has a domed profile with somewhat steep side slopes. A swampy area is located along the western side of the landfill. A general site location map is provided as Figure 1. A Site Plan is provided as Figure 2.

There is a leachate collection system for the landfill which is pumped out periodically by the Town via a subcontracted Part 364 permitted septage hauler; the leachate is subsequently disposed of at the City of Kingston wastewater treatment plant. The landfill cap and leachate collection system are maintained by the Town.

The former Hurley Highway Department building occupies the southern portion of the site, as does the active transfer station complex and a salt storage structure; all of which are located adjacent to the inactive landfill area. As of the date of this report, the Highway Department has been vacated; however, the transfer station is still in operation and the salt storage structure is still actively used. Access to the property is somewhat restricted by a perimeter fence on the north and east.

B. Objective

As indicated within NYSDEC consent order CO 3-20211220-61, the primary goal of this investigation work was to appropriately characterize contamination at the site and to determine if the site presents a significant threat to public health or the environment. The consent order also provides a mechanism to implement any necessary interim remedial measures and associated site management practices determined to be necessary moving forward as a result of this investigation work.

Although the primary focus of this investigation was on emerging contaminants, other more typical contaminants such as volatile and semi-volatile organic compounds, target analyte list metals, PCBs, pesticides, herbicides and cyanide were also analyzed for at select locations in accordance with the NYSDEC-approved work plan.

This Site Characterization report details the investigation activities required to meet the goals of the project in accordance with NYSDEC regulations and program policy. Investigation activities were carried out in accordance with the NYSDEC's Department of Environmental Remediation (DER)-10 (Technical Guidance for Site Investigation and Remediation) issued May 3, 2010 and NYSDEC's Sampling, Analysis, and Assessment of PFAS guidance document, dated June 2021.

II. Relevant Background Information

A. Landfill Closure & Post Closure Monitoring

Landfill closure activities occurred in the early 1990s and included installation of an engineered cover system, installation of gas vents and a gas venting trench, as well as installation of a leachate collection system. Leachate is collected through a system located beneath the landfill cap as well as a surface system constructed in 2001 to capture a seep that occurred after the landfill was capped.

Based on closure investigation activities it was thought the base of the waste mass (the bottom elevation of the rock quarry) was at elevation 634 ft and that leachate was migrating to the swale excavated along the western side of the landfill in an effort to divert water from travelling through the waste mass.

The leachate collection system below the cap was constructed along the western edge of the landfill in an effort to collect leachate that migrated laterally. The collection system includes 548 linear feet of perforated collection line draining into two 2,000-gallon tanks. The collection system was installed to a depth of bedrock (with low permeability clay installed to create a suitable sub-base above the bedrock) or 12 ft maximum. It is worth noting that the as-built drawing indicates that the system was installed to the depth of bedrock other than for an approximate 250 ft length in the area of MW-4 where it was installed to a depth of 12 ft. In this area, high groundwater and silty sandy soils with very little cohesion made excavation difficult. Due to the bedrock the collection line was installed at a slope of 0.5% over its length. It is also noted that groundwater was encountered during the installation of the 2,000-gallon tanks and along a portion of the collection line.

Following the closure of the landfill, a leachate seep appeared at the surface to the west of the 2,000-gallon tanks. A surface leachate collection system (consisting of a berm and 2-1,000-gallon tanks) was constructed to capture this leachate and transfer it to the 2,000-gallon tanks for offsite treatment and disposal. A 10,000 gallon above ground storage tank was also installed to provide additional storage.

Since the closure of the landfill and installation of the surface leachate collection system, the Town has had the leachate hauled to the City of Kingston Wastewater Treatment Plant for treatment and disposal. At some point the Town reconfigured the system so that a pump installed within a sump in the system pumped directly to the below cap leachate collection system for storage in the 2,000-gallon tanks.

Around 2007 the Town installed a stormwater conveyance system to collect the stormwater draining off the landfill cap and convey it to the western drainage swale.

In 2022, the Town made repairs to the system including the following:

- Overgrown vegetation trimming & disposal.
- Hand digging around all tanks to determine the condition of the piping & secondary containment.
- Repair of the 4-inch PVC standpipe for the 10K gallon tank.
- Repair of the clay berm associated with the surface leachate collection system.

- Purchase and install new control system for Tank pumps and alarm.
- Appropriate backfilling, grading and seeding for site restoration purposes.

During this investigation it was found that the 1,000 gallon tanks that were initially installed at the landfill to collect leachate did not include secondary containment and it could not be confirmed that the 10,000 gallon tank included secondary containment (refer to the Site Plan, Figure 2, for a depiction of where the 1,000 and 10,000 gallon leachate tanks are located). Liquid was found in the secondary containment of the 2,000 gallon tanks which will require further investigation. In a report to the NYSDEC it was recommended that any future repairs or investigation be conducted following the results of the Site Characterization so that they can be incorporated as part of any remedial design as warranted.

Due to the volume of leachate that was being hauled the Town additionally covered the surface leachate collection system with tarps to prevent stormwater intrusion into the system. The volume of leachate collected has been an ongoing concern at the landfill.

Post-closure water quality monitoring and off-site residential well monitoring at the Hurley Landfill was and will continue to be conducted on an annual basis in accordance with the approved Post Closure Monitoring and Facility Maintenance Manual for the Closure of the Hurley Landfill, prepared by Crawford & Associates, dated June 1996. It should be noted, however, that from 2013 to 2021, it appears that the annual monitoring was not completed for unknown reasons; but has resumed as of 2022.

There are five existing (5) monitoring wells (MW-1, MW-3, MW-4, MW-6A, and MW-7) one (1) upgradient (MW-1) and four (4) downgradient (MW-3, 4, 6A and 7), as well as three (3) surface water sampling locations from which samples are collected for annual monitoring purposes. One of the three surface-sampling sites is located off-site in the stream discharging in the direction of the former Betty and Ray's store off Route 28A (across the street from 689 Route 28A); the other two surface water sampling locations are located upgradient (SS-5) and downgradient (SS-3) of the surface leachate collection system for the former seep. Eight (8) residential wells are also included in the annual sampling event as part of the post closure-monitoring program. Monitoring wells and surface samples are analyzed for 1993 Part 360 baseline parameters and a number of nearby residential water supply well samples are analyzed for the following select parameters: TDS, Alkalinity, Chloride, Ammonia, Barium, Iron, Manganese, Sodium.

Annual monitoring results for the wells and residential sample locations are compared to the groundwater standards and guidance values for Class GA waters, as listed in the N.Y.S Ambient Water Quality Standard and Guidance Values (T.O.G.S. 1.1.1) document. Surface water test results are compared to 6 NYCRR Part 701 Class A Standards due to the site's proximity to the Ashokan Reservoir, which is a water supply for New York City. Annual Monitoring reports were historically, and will continue to be submitted to:

- New York State Department of Environmental Conservation (NYSDEC), Region 3

  [2022 Contact: Ella Cattabiani ella.cattabiani@dec.ny.gov],
- the New York City Department of Environmental Protection (NYCDEP) [

  [2022 Contact: Joe Damrath jdamrath@dep.nyc.gov] ,
- the Ulster County Department of Health (UCDOH)

[2022 Contact: Director of Environmental Services – Tim Rose tiro@co.ulster.ny.us], and

- the Town of Hurley Supervisor & Deputy Supervisor for distribution to the residents in the monitoring program [2022 Contacts: Melinda McKnight & Peter Humphries suervisor@townofhurley.org & phumphries@townofhurley.org].

B. Current Zoning

The site appears to be located in a business district and is also identified in Ulster County Parcel Access as having a property class of Highway Garage.

C. Land Use of Site & Surrounding Area (Sensitive Receptors)

As mentioned previously, the southern portion of the site was formerly used by the Town of Hurley Highway Department for various maintenance activities including equipment and material (salt) storage, vehicle maintenance and repairs, and as a transfer station with the vast majority of the site being a closed inactive landfill with an associated leachate collection system. As of the date of this report, highway department activities, with exception to the salt storage activities, no longer occur on-site. The transfer station area continues to operate.

The general area is forested with some residential properties to the north. Southwest of the site is West Hurley Public Park. The property is bounded by Collier Road to the north and Dug Hill Road to the east.

Sensitive Receptors

Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. As indicated above, there are private residential properties to the north and in close proximity to the subject site; the age of the occupants is unknown but are likely to include or could potentially include a range of ages extending from young children to elderly people at any given time.

The following schools are located within 5 miles of the subject site:

- Hudson Valley Sudbury School (~2.4 mi NE) at 84 Zena Road, Kingston
- Clifford Miller Middle School (~2.5 mi NE) at 65 Fording Place, Lake Katrine
- Montessori School of Kingston (~4.0 mi SE) at 243 Hurley Avenue, Kingston
- Hurley Nursery School (~4.0 mi SE) at 13 Main Street, Hurley
- Ernest C. Myer Elementary School (~4.0 mi SE) at 231 Millbrook Avenue, Hurley

The following hospitals are located within 5 miles of the subject site:

- Health Alliance Hospital (~5.0 mi SE) at 396 Broadway, Kingston

There does not appear to be any nursing homes, convalescent facilities or daycare facilities within 5 miles of the subject site.

D. Historical Use of Site

The site historically operated as a municipal solid waste landfill from the early 1960s to 1996 when it was closed using Landfill Closure State Assistance Program Funds. As with many landfills in existence in the past, the purpose of the landfill was two-fold: to dispose of the Town's refuse and to fill in lowlands that were considered to be of little value at the time, such as the stone quarry and swampy areas on the site. Potential environmental impacts of operating a landfill back then, were not considered. The following types of waste are documented as having been disposed of at this landfill site: municipal solid waste, C&D debris, brush, logs, and metal filings from Numrich Arms in West Hurley.

As the landfill area was filled in, the drainage flow through the landfill was halted, thereby causing the swamp on the southwestern side of the landfill to increase in size. In March of 1980, the town constructed a ditch in the bedrock, approximately 8-10 ‘ deep in some sections, on the western side of the waste mass to provide drainage for the swamp.

E. Regional Geology

A report (Hydrogeological Investigation included in the Closure Investigation Report) was completed for the subject site in June 1991 by Lawler, Matusky & Skelly Engineering, P.C. which among other things, included the following discussion of regional geology.

The Hurley landfill site area lies about seven miles west and slightly north of Kingston, immediately south of the Ashokan Reservoir. This site is at the eastern edge of the Allegheny Plateau and is situated upon the Middle Devonian rocks of the Hamilton Group. The Allegheny Plateau has its northern limit in New York State, extending from near Albany, westward to Buffalo. Its eastern edge follows the Hudson River from near Albany southward to Kingston, where it begins trending southwestward to the border with New Jersey. The site rests upon the shales, siltstones, and sandstones of the Ashokan Formation.

The Allegheny Plateau in New York is formed entirely of Devonian rocks, which were deposited in both marine and sub-aerial environments as part of the westward progradation of what has in modern times come to be known as the "Catskill Delta".

The source for the sediment which comprises the Devonian rocks in New York was the Acadian Mountain Range, which was undergoing uplift along the northeast coast of North America contemporaneously with the deposition of the rocks of the Plateau. Sediment was shed so rapidly, and in such great quantities from this source land, that a vast pro grading plain of alluviation was formed which encroached upon the marine environment present in the site area during the Early Devonian. These marine rocks, the limestones of the Helderberg Group and the cherty limestones and shales of the Ononadaga Group formed the "basement" upon which the great thicknesses of Catskill sediments were deposited. The shoreline of this ancestral sea regressed westward throughout the Devonian, the result being that the majority of the sediment of the Allegheny Plateau was deposited sub-aerially, as alluvium. The transition zone (deltaic facies) rocks deposited in this system are exposed along the northern and eastern edges of the Plateau, between the marine carbonates which form the border rocks of the Plateau, and the sub-aerial alluvial deposits which make up the Catskill Mountains.

The primary depositional agent in coastal fluvial aggradation is the delta. The composition of deltas is variable depending on the morphology of the individual delta, which is to a large degree controlled by the interaction of three factors. These are the size of the river emptying into the marine basin, the relative energy of the water in the basin at the delta location, and the depth of the water in the basin. It has been theorized that the delta complex existing along the western edge of the Acadian upland comprised numerous deltas of the shoal-water type. These deltas deposit in water six to ten meters deep. This theory is based upon the absence of thick "bar-finger sands" in the fine-grained Hamilton sediments and the fact that these sediments constitute a relatively thin sequence compared to the overlying fluvial deposits which are found in the Catskill stratigraphic column (Friedman et al. 1978).

The deposits composing the portion of the delta most proximal to the landmass are collectively termed the topset deposits, which include the distributary channel deposit and their flanking natural levees, and the interchannel area deposits. In the shoal-water type of environment the distributary channel-bottom deposits build prisms of only nominal thickness during normal stages of sedimentation. This phenomena is a reflection of the shallowness of the basin which does not allow for deposition of thick sequences of soft, low-strength channel bottom units (i.e., these beds can only be as thick as the depth of the water in which they were deposited from) as is the case in deeper-water deltas. The result is that channel bottom substrate is relatively firm, and the delta progrades rapidly. This phenomena is contrasted with the deeper-water setting of "bird's-foot" type deltas, like the Mississippi. Here the deeper water has allowed the buildup of thick, soft channel-bottom deposits. During flood stages, bed-load instead of prograding laterally, sinks into this soft substrate, forming thick "pods", or "thick bar-finger sands". It is the absence of these features in the Catskill deltaic deposits which mark them as being of the shoal-water type.

Topset deposits possess both large and small cross bedding, a result of flow induced migration of large and small bedforms. Topset deposits also include thin sheets of silty clay formed in interdistributary bays and marshes. Bioturbation is often evidenced in these sediments, especially those produced in marshes. Also, part of the topset deposits are the very fine sands and silts of the distributary channel margin levees, which typically pinch out fairly abruptly.

The prograding delta scenario is a dynamic one. Distributary channels constantly undergo avulsion, or channel-switching, as they fill-in and transfer to more advantageous gradients that are made available through basin subsidence produced both tectonically and as a result of compaction. Interdistributary areas are cut by new channels, and old channels and levees are covered with silts and clays, becoming marshes themselves.

It is this type of setting which is interpreted as having formed the rocks of the Ashokan Formation. The sandstones as observed in outcrop show thick (2 - 4ft) cross-bedded intervals interrelated with thinner (1 - 3ft) intervals of more well-laminated strata. Units are often not laterally continuous, especially the thick cross-bedded ones. The blue-gray sandstones are distributary channel deposits, the siltstones tidal channel and levee deposits, and the mudstones and shales interdistributary marsh deposits.

F. Structural Geology

A Structural Geology determination for the subject site was also completed for the subject site in June 1991 by Lawler, Matusky & Skelly Engineering, P.C., which was included in the Closure Investigation Report, and included the following summary.

The Catskill Delta complex rocks in New York are slightly deformed. The strata generally dip to the northwest along the eastern edge of the Allegheny Plateau, and generally southwest along the northern edge, producing an overall westward dip for the Catskill-complex sediments.

In the east, the inclination of the strata is more pronounced than that in the west, a reflection of the tectonic influences on the area, which have historically been propagated along the east coast of the continent. The Hamilton Group rocks in the study area possess distinct fracturing, the cause of which was probably the stresses produced during the Alleghenian diastrophic event of the late Carboniferous and Permian (Levin, 1988).

The most significant structures at Hurley are undoubtedly the joint sets which are readily observable in outcrop and on stereo aerial photographs as topographic lineations. Field inspection of outcrops in the study area indicates the presence of a pronounced joint system composed of two joint sets (fracture sets). Analysis of numerous attitude measurements taken from these joints reveals one set with an average strike of N 24.5°E (north-south set) and another with an average strike of N 71°W (east-west set).

The dips of both of these fracture sets cluster around 90°, i.e., they are basically vertical. The dips for the north-south set range on the average 5° in either direction from the vertical. The east-west set dips range on the average 12° in either direction from the vertical. The joint spacing is fairly regular, about every 20-30 ft.

These two nearly vertical joint sets are interpreted as shear fractures due to lateral compression of the Catskill rocks. The direction through which the greatest compressive force was applied upon the rocks at Hurley is computed to be along a vector-oriented N 67°E. In this model, the least compressive force was also in a lateral direction, oriented along a line trending E 67°S. The intermediate compressive force was in the vertical direction and constituted the load pressure of the overlying rocks. This analysis is consistent with the mechanics of failure by rupture, applicable to joint systems in all types of rock (Billings, 1972).

A third set of joints is evidenced in the rock at Hurley. These are release fractures developed in a horizontal plane, as a response to the release of a vertical load, or compressive force. This phenomena is well-known in quarries where it is called "sheeting." Large amounts of rock have been removed relatively quickly, and the rocks "unload" creating horizontal joints.

These types of fractures are typically very closely spaced (one to two inches), and are propagated at very shallow depths, usually not more than a few tens of feet (Billings, 1972). This mechanism has been found to be active at Hurley, proven through core inspection. The horizontal fractures are present generally only to a depth of 15 ft.

G. Glacial Geology

The following glacial geology determination was also provided for the subject site in June 1991 by Lawler, Matusky & Skelly Engineering, P.C. as a component of the Landfill Closure Investigation Report.

The study area underwent extensive glaciation during the Pleistocene Epoch, which began approximately 1.8 million years ago. There are four recorded intervals of glaciation during this time, the most recent being the Wisconsin glaciation, taking place from 115,000 years ago to 8000 years ago.

The entire Wisconsin glaciation took place in a series of short staccato advances and retreats of an uncertain ice sheet. The retreats were not as extensive as is characteristic of proper deglaciation, and so fall within the domain of the Wisconsin. Each of these pulses has been chronicled as lasting about 15,000 years (Bloom, 1978). A global warming trend began about 16,000 years ago, and the ensuing deglaciation produced heavy sedimentation south of the retreating glacial front as meltwater streams and lakes formed in the valleys modified and now abandoned by the glaciers. It is these sediments, and that debris deposited directly by the glaciers, which make up the overburden material in the study area.

Sediment unloaded directly by glaciers without having undergone any reworking by meltwater is termed "till". It is usually poorly sorted and lacks distinct stratification. Till that has been deposited by an active glacier is termed lodgment till. This material once existed beneath the glaciers and is quite dense and often clay-rich. Ablation till is that till which has been deposited by a melting glacier without being overridden by the glacier (i.e., has "melted out" of the glacier). These deposits are typically not as dense as lodgement till and lack the finer-grained sediments.

It is these types of deposits which are found at Hurley. As is typical in topographically elevated areas, the glacial overburden is not of great thickness.

H. Hydrogeology

A hydrogeologic investigation was also completed for the subject site in June 1991 by Lawler, Matusky & Skelly Engineering, P.C. as a component of the Landfill Closure Investigation Report. This hydrogeologic investigation confirmed that the site was a former quarry and that landfill material was deposited directly onto the bedrock. The report also indicates that static water level measurements confirmed that the base of the landfill is in close proximity to the groundwater table. A system of vertical fractures in the bedrock are present based on field studies completed. Shallow horizontal fractures are abundant towards the top of the bedrock and become more scarce as the depth into the bedrock increases based on analysis of extensive bedrock cores collected. Hydraulic conductivities within the monitoring wells that were installed within the fractured bedrock at the time of the hydrogeologic investigation ranged from 6.617×10^{-6} to 1.841×10^{-2} cm/sec.

Groundwater flow direction is governed by differences in hydraulic head. Groundwater in elevated (recharge) areas possesses higher head than that in depressed (discharge) locations and will follow the gradient so developed.

At Hurley, near-surface groundwater flow tends to be influenced by differences in local gradient. These local differences are provided by the somewhat convoluted local topography which has developed on a

pronounced bedrock joint (fracture) system and has been overprinted by recent glaciation. At depths within the aquifer, groundwater flow directions are governed by the regional gradient. This regional gradient is provided by the difference in elevation between the Catskill Mountains, which act as a regional recharge area, and the Hudson River, which acts as the regional discharge area.

The Hurley aquifer is mainly in bedrock which evidences some confining conditions (possibly local) with alternating shales and sandstones. Overburden at the site is very thin and is in some cases absent. Permeability is chiefly defined by structural anomalies because the bedrock is generally fine-grained, somewhat argillaceous and carries a competent matrix, dictating low primary porosity and permeability. The landfill's location in the foothills of the Catskill Mountains and at a (locally) topographically elevated position contributes to some interesting characteristics in the attitude of the water table and its flow direction.

Structure at Hurley consists of well-developed vertical joint systems in which the two fracture sets are essentially at right angles to each other. They are quite evenly spaced and as such tend to lend a generally isotropic character to secondary permeability. The strata, dip slightly to the west, at about six degrees. Bedding planes and shallow fractures paralleling bedding planes also play a role in secondary permeability, mostly at shallow depths.

There is a topographic drainage divide which staggers through the area closely approaching the landfill to the west and south. Shallow groundwater flowing westward off the landfill comes under the influence of this local divide, and is diverted northwards, towards the area of lower local head. Groundwater seepage flow to the west and north of the landfill is tentatively confirmed by the presence of a pool to the northwest of the site.

Water enters this "pooling" area primarily through a ditch excavated in bedrock along the western edge of the landfill. According to site personnel at the time the hydrogeologic investigation was completed, a wetland that is located at the southwest edge of the landfill at the time, was not always evident.

It was suspected that a small wetland was present and that its outflow drained into the quarry to the north, finally flowing under Route 28A near a small grocery store (Betty and Ray's Convenience Store, currently known as 689 Route 28A) and into a larger wetland that is part of the Ashokan Reservoir. As the landfill grew, water began backing up, increasing the size of the wetlands. In March of 1980, the ditch along the western edge of the landfill was constructed to help drain this wetland. In 1991, it was discovered that a 400-500 ft - long stone pile had been placed in the stream between the pooling area and Route 28A. Flow passes through this stone-filled channel and discharges to the wetlands located immediately north of Route 28A, across the road from what was known as Betty and Ray's Convenience Store.

Based upon site reconnaissance and water level readings taken from the onsite monitoring wells in 1991, the localized water table was found to slope predominantly to the northwest. However, the slope of the water table in the opposite direction (to the southeast) in the region immediately south of the waste mass reflects water-level data collected from MW-1; this seemingly anomalous flow direction is actually a result of several hydrogeologic factors.

Field and topographic map inspection indicate that the landfill is situated at the crest of a ridge-like hill. The long axis of the hill trends N 25° E. The western part of the hill slopes to a low point of 625 ft, about 325 ft

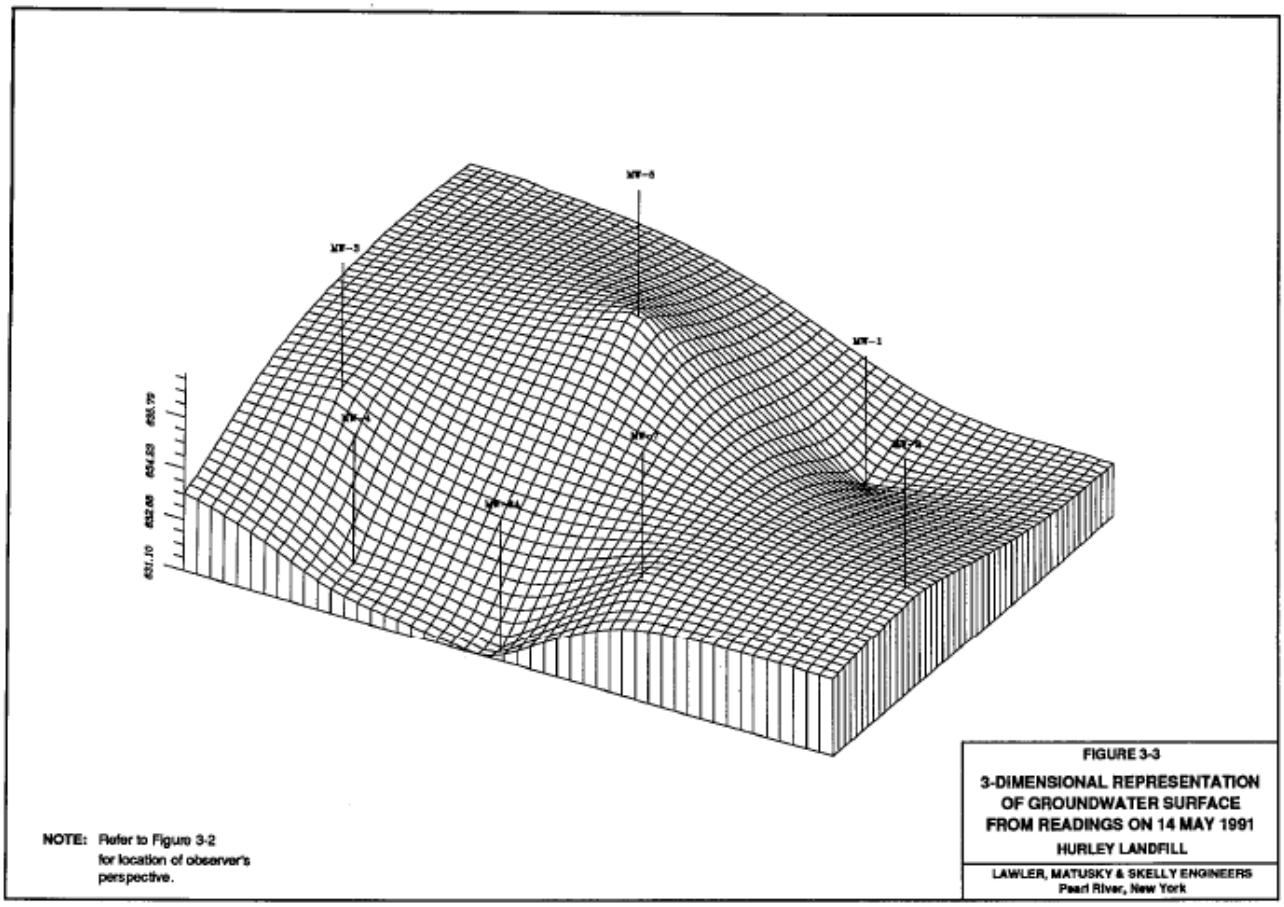
northwest of the center of the landfill before the ground surface rises again. The swale which results slopes away to the north. Bedding planes as measured in the undeformed bedrock yield an average dip of 6°, to the west. While groundwater would normally be expected to flow evenly away from the crest of the hill, to either side, this uniform dip of the strata to the west induces a westward bias to the flow direction. The near-surface fractures which parallel the bedding planes accentuate this effect by providing ample conduits for flow.

The eastern slope of this ridge-like hill is somewhat steeper, as well as longer. This slope is the western side of a ravine which trends N 25° E. The floor of the ravine slopes away to the north. The ground surfaces slope southeastward from a high point of 657 ft at the eastern edge of the landfill to a low point of 525 ft at the bottom of the ravine. This 125 ft drop occurs through a horizontal distance of approximately 800 ft. Since no springs or outflows of water were observed along this slope, it is conjectured that the water table slopes rather steeply from its measured elevation at MW 5 (637.20 ft on 14 May 1991) to the stream flowing in the ravine.

Consequently, by virtue of its location 175 ft closer to the edge of the ravine than any of the other monitoring wells, MW-1 is most probably monitoring groundwater flowing southeastward from the local water table crest. As such, the water table is at a lower elevation than that measured in wells nearer the crest (MW-2 and MW-5).

Overshadowing these characteristics of the local water table is the regional slope in the area, which is to the southeast, towards the Hudson River. Regardless of the direction of localized groundwater flow, some portion of the groundwater flowing through the area will follow this regional slope. This is the "deep" groundwater component of the aquifer. Indeed, water in the Ashokan Reservoir is likely influent to the bedrock aquifer, and travels to the Hudson River as groundwater.

In summary, the fate of groundwater beneath the Hurley landfill is twofold. A portion (shallow groundwater) follows the local gradient northwards and is discharged to the Ashokan Reservoir. The remainder, probably the bulk of the groundwater (deep groundwater), flows ultimately to the southeast, receiving additional recharge along the way from the shallow component subject to the vagaries of the convoluted foothill topography, on its way to the Hudson River. The following figure provides a 3 dimensional depiction of the groundwater surface from readings collected back in May of 1991.



I. Fracture Trace Analysis

A fracture trace analysis was also completed for the subject site in June 1991 by Lawler, Matusky & Skelly Engineering, P.C. as a component of the Landfill Closure Investigation Report.

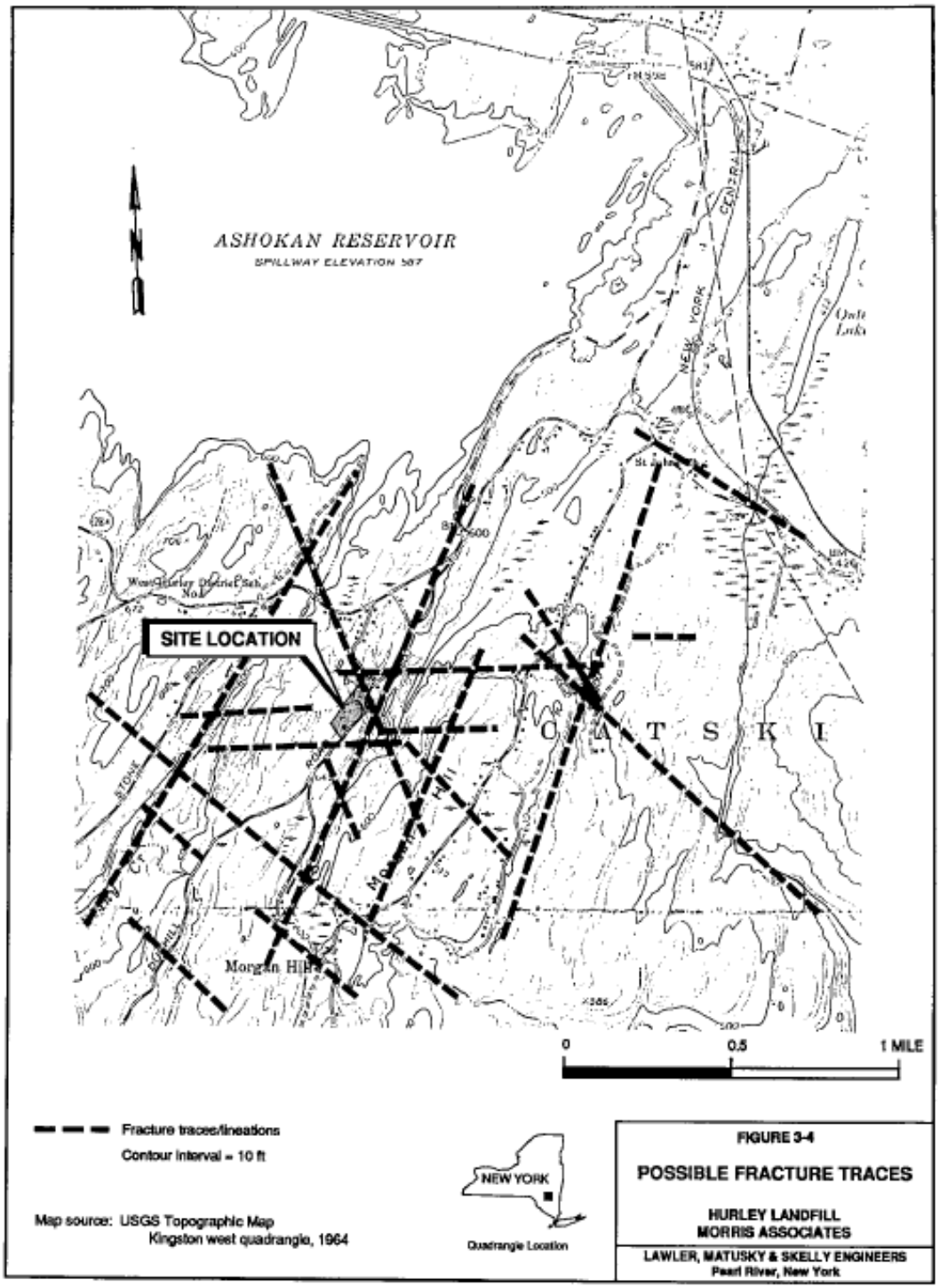
Evaluation of stereo pair aerial photographs for bedrock defects is termed Fracture Trace Analysis (FTA). This technique is useful in delineating geological features not readily apparent in field structural investigations. Where fracture traces follow shallow earth depressions and ridges, they define the orientation of what may be high-permeability zones. These zones ordinarily consist of rock with not one fracture but swarms of deep parallel bedrock breaks. Under optimal circumstances FTA can penetrate gravel and overburden thickness to as much as 3000 ft. Where rock is deformed, FTA may delineate the axial plane orientation as it is associated with folding. On occasion, FTA identifies features that are unexplained by detailed surface geological examination. The absence of explanation does not disqualify the feature as a bonafide FT. When/where FTs go unexplained, they are called phantoms. These tests were useful at West Hurley because the FTA provided some collaborative information to the structural analysis performed in the field.

Stereo aerial photographs taken in March 1968 were used to evaluate the Hurley Landfill locale southeast of the Ashokan Reservoir. The FTA features identified are all linear, but not all parallel. Because the FTA identifies generic linear trace features without identifying what may cause them and because each feature

is represented by a line, the feature shall be called a lineament. The most distinct of these found at Hurley are shown as lines in the depiction below (Figure 3-4 from the Lawler, Matusky & Skelly Engineers report). Some of the fractures are continuous, over the length of a mile and others are as short as one-third of a mile. By field observations LMS geologists determined that they represent fracture swarms.

The most prominent lineaments in this locale are found oriented N40°E (±10°). This lineament is clearly represented throughout the aerial photographs, and it is created by the eroded, cuesta edge of bedrock that dips gently N50°W. A second lineament is found to strike N65°E (±5°), and a third strikes almost east-west.

All are potential contributors to the direction of groundwater movement in this general locale. MW-1 and MW-2 appear to be in "proximity" to a fracture swarm while MW-3 and MW-4 may be directly on these features.


ASHOKAN RESERVOIR
SPILLWAY ELEVATION 587
SITE LOCATION
C A T S K I
Morgan Hill
0
0.5
1 MILE
Fracture traces/lineations
Contour interval = 10 ft
Map source: USGS Topographic Map
Kingston west quadrangle, 1964
NEW YORK
Quadrangle Location
FIGURE 3-4
POSSIBLE FRACTURE TRACES
HURLEY LANDFILL
MORRIS ASSOCIATES
LAWLER, MATUSKY & SKELLY ENGINEERS
Pearl River, New York

J. Pre-Existing Monitoring Wells

A total of eight monitoring wells were installed around the perimeter of the Hurley Landfill in 1991 by LMS who noted that, "although this exceeds the minimum number required by the NYSDEC the minimum was judged to be inadequate". LMS evaluated both the number and the locations of these wells as essential in determining the actual groundwater flow patterns from the site.

Borehole advancement through the relatively thin overburden material was accomplished using 4.25 in. ID. hollow stem augers. When bedrock was encountered, the protective steel casing was installed and grouted in place before continuing. Several drilling locations contained very little cover material. A six-inch diameter corehole was made to sufficient depth in the bedrock of these boreholes so that the protective steel casing could be firmly grouted into place. Coreholes were continued into bedrock using an HQ (3.79 in. O.D.) core barrel and an associated four-inch casing. Potable water was used as the non-circulated drilling fluid. As water exited the corehole it was allowed to flow over the ground surface. When depth in bedrock was reached sufficient to guarantee stable well construction, a section of 3 in. PVC casing was set into the open hole and was grouted into place. The grout mixture, consisting of Type 1 portland cement and bentonite powder was allowed a minimum of 24 hours to set before continuing the open hole drilling. Following set-up of the grout mixture, coring was continued in bedrock by use of an NX (2.98 in. O.D.) core barrel. Continuous circulation of potable water was again used to flush cuttings from the hole and to cool the drill bit. Bedrock was removed in five-foot sections and coring times required for each foot of advance were recorded. Groundwater levels were checked following the removal of each ten feet of rock core. This was accomplished by removing the remaining water in the borehole (remnant of the coring operation) by means of compressed air, and then waiting for groundwater (if any) to re-equilibrate. Upon encountering saturated bedrock, an additional 20 feet of core was removed.

Following the completion of the drilling task each well was developed using either (or both) a submersible pump or Teflon bailer. The main purpose of development was to remove any remaining rock cuttings that might have settled to the bottom of the core hole, and to flush any drilling water that may have remained within the well. During development both well yield and turbidity were measured. Development was continued until either turbidity fell below 50 nephelometric units (NTU's) or a period of four hours was expended.

It was also noted in 1991 that two unrelated water supply wells for the Town buildings were previously drilled at the landfill, one in 1985 (80' deep well) and one in 1987 (290' deep). The latter of the two reportedly had "60 ft of head" at the time of drilling, but no other well data appears to be available for either of these two supply wells. Of interest is that the static water level readings for these wells on May 19, 1991, was about 59 ft below grade. A well on adjoining town property approximately 2000 ft southwest of these two supply wells is used as an alternate source of water. This alternate well, drilled in 1982, is reportedly 305 ft deep with 40 ft of casing. It tested at 15 gpm at the time of drilling and the well log was also unavailable.

Copies of the monitoring well completion logs for the pre-existing wells are provided as Appendix A. Note: Monitoring Well MW-2 was historically closed.

K. Existing Monitoring Well Core Analysis

As documented in the LMS report, the monitoring well cores were composed of medium, fine, and very fine sands, silt and clay with a non-calcareous cement. They were, with very few exceptions, very well indurated. The sandstones are all gray or dark gray in color, the siltstones light to dark gray, and the shales dark gray to black. Intervals of sandy matrix surrounding abundant mud clasts were common.

The fine sandstones are often pyritiferous, indicating that they occupied a reducing environment for some period of time, most probably during diagenesis, when bacterially produced hydrogen sulphide reacted with available iron. This mechanism is most common in marine muds below the oxygenated zone (Leeder 1982). In some cores the pyrite appears to have altered to iron oxide, probably a post-diagenetic development. Where sands overlay silts, sand infilling of what appear to be vertical burrows in silt can be sometimes seen.

The interbedded sandstones and siltstones show thin (0.5 cm) uniform laminations in some intervals and cross-bedding in others. Plant remains are frequently found throughout the cores. The shales and silty shales are very tight, and their appearance in the column is usually quite sharp, with little or no gradation. Soft-sediment deformation features are readily discernable, possibly indicating rapid deposition.

It is the mud clasts zones which, coupled with the plant remains, give an indication of the depositional environment. The two distinct, discrete grain-sizes in these zones (essentially shale clasts and sand matrix) imply fairly high flow rates in a setting of definite net deposition. These deposits probably represent channel-switching events on a fine-grained delta. As sand filled distributary channels abandon old courses in favor of more advantageous gradients, interdistributary marshes are cut by the new channels and the cohesive organic clays are entrained as lumps in the fast-moving water. They are then buried in the sand downstream. Storm (flood) events no doubt played a large part in these channel-switching events. Thin (<0.5 cm) layers of fine sand are observable in the shales, most likely a result of overbank deposition during flood stages.

Three of the cores encountered an interval of clayey silt. These silt seams ranged in thickness from 2- to 4-in. These seams were observed in the cores from MW-1, MW-4, and MW-5 at depths of 23.1, 20.6, and 20.5 ft below grade, respectively. The material is light tan in color, and of noticeably lower density than the surrounding rock.

L. In-Situ Hydraulic Conductivity Testing

LMS also completed in situ hydraulic conductivity testing at the subject site in 1991. The following information was provided in the LMS report.

The terms hydraulic conductivity and permeability are frequently interchanged in hydrogeology, but the difference should be recognized. Permeability refers only to the characteristics of the porous matrix. It has the dimensions of a surface (i.e., cm2) and is generally expressed in darcys (or millidarcys) as defined in Darcy's law.

Hydraulic conductivity (also termed the coefficient of permeability) is the specific discharge per unit of hydraulic gradient. It depends on both rock and fluid properties and is generally expressed in meters/sec or cm/sec. For example, a sandstone may have a fixed permeability of two darcys, but the ability of that

sandstone to transmit fluid will change depending on the gradient (slope), type of fluid and pressure driving it. Typically clays will exhibit porosities of about 40-60% and hydraulic conductivities of between 10-11 and 10-7 cm/sec. Silts will typically exhibit porosities of about 35-50% and hydraulic conductivities of between 10·5 and 10-3 cm/sec.

The hydraulic conductivity of an aquifer near a well can be determined through slug testing. A known volume of water is displaced from a well in which the water level is at equilibrium with the existing water table. This displacement occurs when the "slug" (e.g., a stainless-steel bar of known volume) is instantaneously lowered into the water column displacing/elevating the water table in the well. The gradual return to water level within, the well to the equilibrium level can be monitored at specific time intervals, and the data obtained used to determine the hydraulic conductivity (which indicates the permeable nature of the rocks or sediments). When the slug is removed, the test can be repeated, this time with the well water lower than the ambient water table.

Slug tests were performed on the monitoring wells at the Hurley site on the 29th and 30th of June 1991. Hydraulic conductivities ranged from 6.617 x 10^{-6} to 1.841 x 10^{-2} cm/sec (five wells were in the 10^{-4} cm/sec. range).

M. Soil Gas Survey Information

A preliminary soil-gas survey was conducted at the Town of Hurley Highway Department maintenance area located adjacent to the landfill, to the south by LMS on March 20, 1991. The following information was provided in the LMS report which was included in the Hurley Landfill Closure Investigation Report.

Initial test holes were advanced using a slam bar (a long steel rod with a movable weight attached to the top). The rod was then removed to ascertain whether the saturated zone had been penetrated. Once a satisfactory hole was established, i.e., one which did not penetrate the water table, a hollow copper tube with perforated section at the bottom which was connected to a teflon hose at the top was inserted into the hole. The hole was then purged using a battery-powered vacuum pump for one to two minutes. Once gas flow was confirmed, the probe was monitored for total organic vapors (TOV). The instrumentation used was a Foxboro Organic Vapor Analyzer (OVA). The OVA was calibrated to methane and was adjusted to survey mode. A gas sample was subsequently drawn into the probe and was transmitted to the detector chamber by an internal pumping system. The vapor concentration as methane and methane equivalent was meter displayed as a direct-reading of total organic vapors (TOV) in parts per million (ppm).

Organic vapors were detected in nearly all of the probes installed. The test holes inside the concrete maintenance building showed concentrations ranging from background (about 1 ppm) to 600 ppm TOV. The highest readings were associated with oil stains in the dirt floor from maintenance vehicles. Soil thickness inside the building ranged mostly from one to about four feet. Bedrock was exposed in one area also. Outside, north and west of the building, the test holes showed measurements of over 1,000 ppm for TOV and methane. This area was built over buried landfill debris; it was visible in a hole dug near the fence of the western boundary to retain salt solution. Some of this material may have been recovered from roads and dumped by the town highway crews. The methane concentrations indicate that some putrescibles may

be present. Readings around the Quonset and salt storage buildings ranged from 20 to 350 ppm. Bedrock was not encountered at these latter locations.

An auxiliary soil-gas survey was carried out around the perimeter of the landfill on 4 June 1991. It was noted that the water table was fairly close to the ground surface along the northern, western, and southern edges of the landfill; consequently, the depth to which the probes were driven often did not exceed two feet.

The auxiliary survey failed to find significant migration of organic vapors from the waste mass. Higher readings were obtained at locations very close to the edges of the waste mass (in a few cases, even these locations yielded no more than background readings). Two additional probes were placed in the maintenance area during the auxiliary survey. These probes yielded concentration readings of over 1000 ppm.

In summary, the soil gas surveys revealed that where soil or cut-and-fill material overlies refuse TOV concentrations are fairly high. Lateral migration of TOVs from these areas through the vadose zone, however, is minimal.

N. Surface Water Classifications Around the Landfill

As indicated in the LMS component of the 1991 Landfill Closure Investigation Report, surface water located in and around the Hurley Landfill are Class D surface waters, applicable to the protection and propagation of fish. The small brook that runs north along a ravine on the southeast side of the landfill and meanders to the east, where it eventually feeds the Praymaher Brook, is a class C(T) surface water, applicable to the protection and maintenance of fish species including the family Salmonidae.

O. Sampling Summary & Site Classification

The following provides a summary of available sampling information for the subject site up to and excluding the current investigation work completed.

- 1991

  As indicated in the LMS component of the 1991 Landfill Closure Investigation Report, in general, the laboratory results for the monitoring wells and surface water samples collected at the time (in 1991), did show that landfill activity had impacted both groundwater and surface water quality. However, the contaminants that were detected were common to landfill leachate and did not suggest the presence of organic solvent contamination.

- 2012

  Based on a review of the Annual Landfill Monitoring report results for calendar year 2012, monitoring well results suggest leachate contamination in the downgradient direction, with three monitoring wells (MW-4, 6A & 7) exhibiting chemical concentrations higher than MW-1, which is representative of the background level. The groundwater contamination is limited mainly to inorganic parameters, and some heavy metal contaminants.

Surface water sample results indicated that iron and sodium were elevated at all 3 sampling locations (SS-3, SS-5 and at Betty and Rays Stream). Elevated cadmium and ammonia were elevated at the SS-3 location only. Aluminum was only elevated at the SS-5 location. Manganese was elevated at the on-site locations at both SS-3 and SS-5.

The residential well water data from the October 22, 2012, sampling event indicated that residential wells were continuing to show chemical concentrations equal to or higher than upgradient monitoring well, MW-1. Common contaminants in the residential wells include sodium, chloride and TDS.

- 2013

Records show that in March of 2013, C&A, on behalf of the Town, submitted a request to the NYSDEC to remove a few the residential wells from the Annual monitoring program. Additionally, a subsequent request was submitted to the NYSDEC in August 2013 requesting that annual monitoring be reduced to a biennial frequency, since 22 years of on-site data and 19 years of residential data had shown that the analyte concentrations detected had a predominantly downward trend, with a few exceptions.

The following response was provided by the NYSDEC (Steve Parisio) via email on 9/4/2013:

"I have reviewed your submittal but we have not made a final decision on it yet. I am getting ready to send the Town a report on leachate management alternatives which we would like to discuss with them and develop strategy. Water quality monitoring is somewhat connected with the monitoring needed to design a new leachate management strategy. I would like to have that discussion with the Town before deciding. I will be contacting them shortly. Your proposal has merit, and we will try to accommodate it."

No follow-up communication beyond the above email text has been located with regard to the reduction requests, and there are no additional annual monitoring reports for the subject site in C&A files from 2013 through 2021 for unknown reasons.

- 2017

More recently, emerging contaminant sampling was completed by the Division of Materials Management under the Inactive Landfill Initiative in October 2017, which included the collection of 3 groundwater samples from existing monitoring wells (Wells MW-1, MW-4 and MW-6A). Groundwater emerging contaminant results are as follows: MW-1: PFOA of 1.1 ppt & PFOS were ND / MW-4: PFOA of 190 ppt & PFOS 330 ppt / MW-6A: PFOA of 190 ppt & PFOS of 240 ppt. 1,4-Dioxane was ND in MW-1, 0.47 ppb in MW-4 and 1.5 ppb in MW-6A.

- 2018 – 2020 (NYSDEC Monitoring & Results)

  Based on information provided by the NYSDEC, PFAS have also been detected in 2 nearby residential water supply wells (out of 11 locations sampled) at levels greater than 10 ng/L (PFOAs ranging from 14.7 ng/L to 17.4 ng/L & PFOS ranging from 11.2 ng/L to 21.7 ng/L) which could be attributable to current or past operations on the landfill property. Those residences impacted have been provided with an alternate water supply in the form of a point of entry treatment (POET) system or bottled water.

- 2022

  In 2022, the Town re-engaged C&A to assist with resuming annual landfill monitoring activities. The following provides a summary of monitoring locations:

  - Monitoring Wells: MW-1, MW-3, MW-4, MW-6A & MW-7
  - Surface Water: SS-3, SS-5 and Betty & Ray's Stream (opposite of 689 Rt 28A)
  - A number of nearby Residential locations

  A summary report was prepared and submitted to the NYSDEC and other relevant parties, as appropriate.

  In general, the groundwater and surface water exceedances at the Hurley Landfill based on the 2022 monitoring results appear to have remained fairly minimal and similar to the data that was generated back in 2012. Limited inorganic leachate contamination influence has been detected in the down-gradient direction; however, the levels reported do not appear to warrant significant concern.

  Limited nearby residential well data was obtained from the 2022 sampling effort. Data from the two locations that were able to be sampled, have concentrations of some of the constituents sampled at levels that are greater than that which has been detected in the landfills' upgradient monitoring well (MW-1). Common constituents detected in the two residential wells sampled include total dissolved solids, manganese, iron, and sodium.

Site Classification

Per the New York State Department of Environmental Conservation (NYSDEC) Site Remediation Database, this site is currently considered to be a Class P Site; a potential registry site.

For Class P sites, the "DEC offers this information with the caution that it should not be used to form conclusions about site contamination beyond what is implied by the classification of this site, namely, that there is a potential for concern about site contamination. Information regarding a Class P site is by definition preliminary in nature and unverified because the DEC's investigation of the site was not yet complete. Due to the preliminary nature of this information, significant conclusions or decisions should not be based solely upon this summary."

P. Environmental Records Search

An environmental records search was conducted via Envirosite Corporation on April 25, 2022; a summary of the search results are as follows for the site (Landfill) and immediately surrounding area (Transfer/Recycling Station, Highway Garage/Department):

- EPA UST
  - Town of Hurley Highway Department: Facility ID NY33333. The site has 1 open and 3 closed underground storage tanks.
- AST PBS – NY
  - Town of Hurley Recycling Center: Site ID 34215, Site Status is Unregulated/Closed. Petroleum Bulk Storage (PBS) PBS #3-600953.
  - Town of Hurley Highway Department: Site ID 33333, Site Status is Active. Petroleum Bulk Storage (PBS) PBS #3-441678.
- UST PBS – NY
  - Town of Hurley Highway Department: Facility ID NY33333. The site has 1 open and 3 closed underground storage tanks.
- EPA LUST
  - Town of Hurley Landfill: Leaking Underground Storage Tank (LUST) ID NY9806705, Report Date August 31, 1998, Status is noted as "No Further Action". Also refer to LTANKS 2 – NY below.
  - Town of Hurley Recycling Center: Leaking Underground Storage Tank (LUST) ID NY8604544, Report Date October 16, 1986, Status is noted as "No Further Action". Also refer to LTANKS 2 – NY below.
- LTANKS 2- NY
  - Town of Hurley Highway Department: NYSDEC Spill Number 9806705, Spill Date August 31, 1998, Cause of Spill is identified as a tank failure. During tank removal activities (1,000-gal diesel fuel tank), contaminated soil was encountered and stockpiled. The amount of material spilled is listed as 0 gallons (unknown). Spill Closure Date is listed as May 14, 1999 & cleanup work is listed as not meeting state standards. Additional information regarding the cleanup of this spill was not available at the time this report was written.
  - Town of Hurley Highway Department: NYSDEC Spill Number 8604544, Spill Date October 16, 1986, Cause of Spill is identified as tank test failure. Re-test conducted in December. Town replaced the 2000-gallon tank that stored gasoline. Spill Closure Date is listed as January 12, 1987 & cleanup work is listed as having met state standards.
- HSWDS – NY
  - Town of Hurley Landfill: Emerging contaminant sampling was conducted by the NYSDEC under the inactive landfill initiative in October 2017 which included the collection of 3 groundwater samples from existing monitoring wells for PFAS analysis. Results were as follows: PFOS ranged

from not detected to 330 ppt; PFOA ranged from 1.1 to 190 ppt; and 1,4-Dioxane ranged from not detected to 1.5 ppb. PFAS were also detected in nearby residential water supply wells which might be attributable to current or past operations on the landfill property. As information becomes available, it will be reviewed by the NYS DOH to determine if site contamination presents a public health exposure concern.

- SHWS – NY
  - Town of Hurley Landfill: State Superfund Program, Class P – Potential Classification (Preliminary Information indicates that the site may have contamination that makes it eligible for consideration for placement on the Registry of Inactive Hazardous Waste Disposal Sites). Emerging contaminant sampling was conducted by the NYSDEC under the inactive landfill initiative in October 2017 which included the collection of 3 groundwater samples from existing monitoring wells for PFAS analysis. Results were as follows: PFOS ranged from not detected to 330 ppt; PFOA ranged from 1.1 to 190 ppt; and 1,4-Dioxane ranged from not detected to 1.5 ppb. PFAS were also detected in nearby residential water supply wells which might be attributable to current or past operations on the landfill property. As information becomes available, it will be reviewed by the NYS DOH to determine if site contamination presents a public health exposure concern.
- SWF/LF – NY
  - Town of Hurley Transfer Station: Solid Waste Registration 56R04, Accepts MSW (Residential, Commercial & Institutional), Comingled Paper & Containers, Wood (Brush, Branches, Trees, Stumps), Yard Waste, Corrugated Cardboard, Glass, Metals (Ferrous & Non Ferrous), Electronics, Waste Oil.
- SPILLS – NY
  - Town of Hurley Landfill: NYSDEC Spill Number 9806705, Spill Date August 31, 1998, Cause of Spill is identified as a tank failure. During tank removal activities (1,000-gal diesel fuel tank), contaminated soil was encountered and stockpiled. The amount of material spilled is listed as 0 gallons. Spill Closure Date is listed as May 14, 1999 & cleanup work is listed as not meeting state standards.
  - Town of Hurley Landfill: NYSDEC Spill Number 9908569, Spill Date October 14, 1999, Cause of Spill is identified as abandoned drums which impacted a small stream. Citizen reported that two 275 gallon petroleum tanks were dumped behind the highway garage in the recycling center and that the tanks were leaking material which was running into a small stream and nearby swamp area – caller was concerned that the Town may bury the tanks on-site. Spill Closure Date is listed as December 30, 1999 and state standards are listed as having been met.
  - Town of Hurley Landfill: NYSDEC Spill Number 2006990, Spill Date November 2, 2020, Cause of Spill is listed as unknown & was reported by the Health Department as impacting the Ashokan reservoir as well as private residential wells. The Health Department requested that action be taken, such as providing residents with an alternate water supply to reduce potential impacts from the landfill involving PFAS. This spill is not provided with a closure date.

- DEBRIS EPA SWRCY
  - Town of Hurley Transfer Station: Disaster Debris Facility
- FRS

  Emission Inventory System of large stationary sources and smaller voluntary reported sources of air point pollution emitters. Information in the registry includes the site name, physical location of the site, emission units & processes, emission release points, control approaches and regulations.
  - Town of Hurley Landfill: Registry ID 110013977526,
  - Town of Hurley Recycling Center: Registry ID 110019744552
  - Town of Hurley Transfer Station: Registry ID 110019417665
- MINES
  - Town of Hurley Landfill: Mine ID 3003139, Listed as abandoned (construction sand and gravel mine). The Hurley landfill was a mine prior to being used as a landfill; the database report appears to have another town listed which may be an accidental typo.
- AOC – NY
  - Town of Hurley Landfill: State Superfund Program, Class P – Potential Classification (Preliminary Information indicates that the site may have contamination that makes it eligible for consideration for placement on the Registry of Inactive Hazardous Waste Disposal Sites).
- SPDES – NY
  - Town of Hurley: SPDES Permit NYR20A425

Appendix B provides a copy of the environmental database records search completed for the subject site.

III. Investigation

The following provides a summary of investigation activities completed in accordance with the NYSDEC approved work plan:

- Installation of 4 additional bedrock monitoring wells which were developed and subsequently sampled for PFAS and 1,4-Dioxane analysis. Note: A 1,4-Dioxane sample was inadvertently not collected for MW-7.
- Well development and groundwater sampling from the following 6 existing monitoring wells: MW-1, 3, 4, 5, 6A, and 7 for PFAS and 1,4-Dioxane analysis.
- Collection of soil samples for laboratory analysis from each of the 4 new monitoring locations at the following intervals:
  - Surficial Grab Sample from 0 – 2" below surface grade (bsg) & beneath any vegetative cover – total of 3 samples. MW-10 did not have a 0 - 2" soil interval because it consisted of asphaltic pavement.
  - Shallow Composite Sample from 2" – 12" bsg – total of 4 samples
  - The soil/water interface was not encountered at any of the 4 new well locations, so no samples were collected from this interval. However, for MW-10, there was a soil/garbage interval that the NYSDEC requested sampling from, which was completed in lieu of soil/water interface sampling at this particular location.
- Collection of 5 surface water samples from historical surface sample locations SS-1, SS-3, SS-4, SS-5 & BRS (BRS is off-site & across the street from 689 Route 28A – aka Betty & Ray's Stream) for PFAS and 1,4-Dioxane analysis. Note: Location SS-2 no longer exists.
- Collection of 5 sediment samples to be co-located with the surface water sample locations for PFAS and 1,4-Dioxane analysis.
- Well gauging and development for an updated groundwater flow contour map.

Details regarding monitoring well installation activities as well as development and sampling methodologies are discussed in subsequent sections of this report, as is management of investigation derived waste and equipment decontamination procedures utilized. Additionally, at least 20% of all samples collected were analyzed for the "full suite" of parameters as listed in Section IIID of this report.

A. Utility Clearance

Since site characterization investigation work involved subsurface fieldwork activities, a mark-out of known underground utilities was conducted prior to initiating the fieldwork. This was accomplished by notifying UDIG.NY (formerly known as "Digsafe NY") and by having a non-invasive ground-penetrating radar (GPR) survey completed for limited portions of the site, where new wells were proposed to be installed, as an additional precautionary measure.

B. Monitoring Well Installation & Development

Existing onsite monitoring wells (MW-1, MW-3, MW-4, MW-5, MW-6A and MW-7) have been installed into the subsurface bedrock to depths that range from 25.3 ft to 50.5 ft below surface grade. The 4 new wells (MW-8, MW-9, MW-10 and MW-11) have been installed into the subsurface bedrock to depths that range from 31 ft to 92.9 ft below surface grade. Existing monitoring wells were installed with stick-up casings as were new monitoring wells MW-8, MW-9 and MW-11; however, new well MW-10 was installed with a flush-mount casing because it is located in a high traffic area.

Borehole advancement for the newly installed monitoring wells was accomplished using a combination of 4.25 in. and/or 6.25 in. ID. hollow stem augers. When bedrock was encountered, a 5 in. diameter protective steel casing was installed and grouted in place. Grout was allowed to set/cure for a minimum of 24 hours before continuing with a 4 in. air hammer to the desired depth, which was generally 5-20 feet beyond when saturated bedrock was encountered. Potable certified PFAS-free water was used as the non-circulated drilling fluid. Refer to Appendix C for a copy of the lab results for the PFAS-free drilling water used.

When the depth in the bedrock was reached which was deemed sufficient to guarantee stable well construction and sufficient groundwater, a 2 in. PVC well (with a screen, riser, sand pack) was set into the open hole and was grouted into place (sand pack 2 ft above the screen with a minimum of 2 ft bentonite seal, and grouted to the surface) for each of the four newly installed wells. The grout mixture consisted of Type 1 Portland cement and bentonite powder.

Following the completion of the drilling task each new well was developed using a “Waterra” hydro lift pump and dedicated PFAS-free high-density polyethylene tubing as well as dedicated surge blocks & foot valves. The main purpose in development was to remove any remaining rock cuttings that may have settled to the bottom of the borehole and to flush any drilling water that may remain within the well for the newly installed wells to ensure that fresh representative groundwater samples would be obtained from the existing wells.

During new well development, both well yield, and turbidity was measured, and development was continued until either turbidity fell below 50 nephelometric units (NTU's), or until a minimum of two hours was expended on a per well basis.

Refer to Figure 2 for a depiction of monitoring well locations. Refer to Appendix D for soil boring logs and well completion logs for the wells installed as part of this characterization investigation (e.g. MW-8 through MW-11).

C. Investigation Derived Waste

Investigation derived waste (IDW) generated during this investigation work included the following:

- Purged groundwater from development and sampling of existing monitoring wells
- Purged potable water used during the drilling process as well as purged groundwater from installation and development of new monitoring wells.
- Drill cuttings from the installation of new monitoring wells
- Spent disposable sampling items, including gloves, polyethylene tubing, etc.

All spent disposable sampling items such as used gloves and tubing was put into waste bags and was subsequently disposed of in the trash as general refuse.

All liquid IDW generated was temporarily containerized and then subsequently discharged to the on-site leachate collection system which is pumped out on a regular basis and disposed of at the City of Kingston wastewater treatment plant.

Soil-drill cuttings were temporarily containerized in a single NYSDOT certified clean 55-gallon drum. Minimal soil cuttings were generated during monitoring well installation (¼ to ½ of a 55-gallon drum) which were temporarily staged on-site pending receipt of the analytical sampling results (which met unrestricted use soil cleanup objectives with exception to slightly elevated levels of lead and elevated levels of zinc). After reviewing the applicable regulations in conjunction with DER-10 and taking into consideration the analytical results for the soil from the site, as well as the fact that there were small pieces of general municipal solid waste (carpeting & miscellaneous plastic items) that were intermingled with the soil cuttings, the following work plan deviation occurred:

- The soil cuttings were disposed of by Town personnel as non-hazardous solid waste/general refuse via a locally permitted waste receiving facility (Ulster County Resource Recovery).

D. Ground Water, Surface Water & Seep Sampling Protocols, Analysis & Results

Field notes were taken while fieldwork activities were being completed to document soil conditions as well as other relevant observations such as depth to groundwater, etc. NYSDEC guidelines for sampling and analysis of PFAS, June 2021 was followed when collecting PFAS samples.

Dedicated new high-density polyethylene tubing was used at each monitoring well sample location for purging/sampling. During purging, the goal was to remove a minimum of 3 well volumes using low flow methodologies. Water quality measurements collected during purging via a flow through cell included: specific conductance, pH, temperature, oxidation/reduction potential (ORP), turbidity, and dissolved oxygen. These measurements were collected at 5-minute intervals during well purging until parameters stabilized and turbidity was less than 50 NTU, or up to a maximum of 2 hours of purging per well had occurred. Turbidities less than 50 NTU were not achieved for all monitoring wells during sampling. New

monitoring wells MW-8, MW-9 and MW-10 had turbidities greater than 1,000 NTUs. Copies of water quality logs are provided in Appendix E.

Surface water and leachate seep sump samples were collected directly into the laboratory containers. Sediment samples were also collected and were co-located with the surface water samples – refer to Section IIIE below for a discussion of sediment sampling protocols and analysis.

After groundwater samples were collected, the bladder pump and horiba equipment and components were decontaminated and cleaned prior to moving to the next sampling location to avoid cross-contamination between samples (cleaned with Alconox detergent and rinsed with PFAS free water).

This landfill has a surficial leachate collection system; therefore, one sample was collected from the leachate collection sump and was analyzed for PFAS by 537 Modified and 1,4-Dioxane by Method 8270 SIMS. Note: A sample was also collected from this sump on June 14, 2022 and was analyzed for the following: Cyanide, 1,4-Dioxane, Phenol, Total Organic Carbon, 1993 Baseline Metals, Hexavalent Chromium, BOD5, Nitrate, Total Dissolved Solids, Turbidity, Color, Sulphates, Chloride, Bromide, Ammonia, COD, Total Kjelkdahl Nitrogen, and Alkalinity – these additional sample results for the Leachate Sump have also been incorporated into this site characterization report as Appendix F.

All samples for lab analysis were placed in laboratory supplied sample containers and were stored in a cool location which does not exceed 4 degrees Celsius prior to being transported to an ELAP certified lab for analysis. The laboratory that performed the analysis is York laboratory [NY Certification Nos. 10854 & 12058] and they hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533.

Based on historic NYSDEC investigation work completed to date, PFAS and 1,4-Dioxane are a concern for the site and for downgradient residential receptors, therefore, all samples collected as part of this investigation were analyzed for PFAS and 1,4-Dioxane, with exception to the groundwater sample for MW-7 in which a 1,4-Dioxane sample was inadvertently not collected.

Additionally, at least 20% of all samples collected per each media category (e.g. ground water & surface water), with exception to the seep sample, was analyzed for the "full suite" of parameters as listed below:

- Groundwater: MW-1 (up-gradient), MW-7 (down-gradient) & MW-8 (down-gradient)
- Surface Water: SS-3 (down-gradient) & SS-5 (up-gradient)

Refer to Figure 2 for a depiction of the sample locations.

<u>Full Suite</u>

- USEPA Target Compound List (TCL) & CP-51 Volatile Organic Compounds (VOCs), including tentatively identified compounds (TICs) via USEPA Method 8260
- USEPA TCL & CP-51 Semi-volatile Organic Compounds (SVOCs), including TICs via USEPA Method 8270
- Target Analyte List (TAL) Metals via USEPA Methods 6010 / 7470 / 7471
- Cyanide via USEPA Method 9012

- PCBs via USEPA Method 8082
- Pesticides via USEPA Method 8081
- Herbicides via USEPA Method 8151
- 1,4-Dioxane via USEPA Method 8270 SIM (with a maximum reporting limit of 0.35 ug/L)
- PFAS via USEPA Method 537m (isotope dilution); reporting limit not to exceed 2 ng/L for PFOS/PFOA and be as close as possible to 2 ng/L for all other PFAS

QA/QC Samples

QA/QC samples were also collected and analyzed as indicated in the approved Quality Assurance Project Plan (QAPP), a summary of which is provided below:

- Groundwater Sampling:
  - Duplicates *(Evaluate Laboratory Repeatability)*:
    - Analysis: PFAS & 1,4-Dioxane
      - Sampling Location: MW-6A
    - Analysis: VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides
      - Sampling Location: MW-8
  - Matrix Spike / Matrix Spike Duplicates *(Evaluate Matrix Effects & Reliability of Analytical Process & Equipment)*:
    - Analysis: PFAS & 1,4-Dioxane
      - Sampling Location: MW-6A
    - Analysis: VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides
      - Sampling Location: MW-8
  - PFAS Field Blanks *(Evidence that Ambient Background During Sampling Activities did not Cause or Contribute to Contamination)*: Collected each day PFAS samples were obtained, per matrix.
  - Trip Blanks (Evaluate if Samples were Contaminated by Ambient Conditions During Transport from the Site to the Lab): Provided for each day VOC samples were collected.
  - Rinse Blanks *(Evaluate Efficacy of Equipment Decontamination & General Cleanliness of Field Sampling Procedures)*: Collected each day sampling was conducted using the bladder pump and water quality meter (Horiba®).

- Surface water Sampling:
  - Duplicates *(Evaluate Laboratory Repeatability):*
    - Analysis: PFAS & 1,4-Dioxane
      - Sample Location: SS-3
    - Analysis: VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides
      - Sample Location: SS-3
  - Matrix Spike / Matrix Spike Duplicates *(Evaluate Matrix Effects & Reliability of Analytical Process & Equipment)*:
    - Analysis: PFAS & 1,4-Dioxane
      - Sample Location: SS-3
    - Analysis: VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides
      - Sample Location: SS-3
  - PFAS Field Blanks *(Evidence that Ambient Background During Sampling Activities did not Cause or Contribute to Contamination)*: Collected each day PFAS samples were obtained, per matrix.
  - Trip Blanks: Each day VOC samples were collected.

Note: Rinse Blanks were not applicable for surface water samples.

Regulatory Standards, Criteria, Guidance Values

Ground and surface water sample results were compared to New York State Department of Environmental Conservation (NYSDEC) Division of Water (DOW) Technical and Operational Guidance Series (TOGS) 1.1.1 Water Quality Standards and Guidance Values and/or NYSDEC Part 703 Groundwater Standards, including subsequent memoranda, as appropriate.

Additionally, for reference, the NYS Department of Health drinking water standards for public water systems has set maximum contaminant levels (MCLs) of 10 parts per trillion (10 ppt) each for PFAS (PFOS & PFOA), and 1 part per billion (ppb) for 1,4-dioxane.

Direction of Groundwater Flow

Figure 3 provides a groundwater contour map based on 2022 site characterization investigation activities which depicts groundwater as flowing in a northwesterly direction. This information is consistent with historical hydrological determinations discussed previously in this report.

Summary of Results with Exceedances

- **Groundwater Samples**
  - PFAS: [Note: NYS DOH Maximum Contaminant Level (MCL) is 10 ng/L – values depicted in bold below also exceed the NYS DOH MCLs for public drinking water. NYSDEC Guidance Values are listed below]
    - MW-3
      - PFOA: **11.3 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: 7.38 ng/L (Guidance Value 2.7 ng/L)
    - MW-4
      - PFOA: **147 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: **286 ng/L** (Guidance Value 2.7 ng/L)
    - MW-5
      - PFOA: 8.98 ng/L (Guidance Value 6.7 ng/L)
      - PFOS: **19.9 ng/L** (Guidance Value 2.7 ng/L)
    - MW-6A
      - PFOS: 4.25 ng/L (Guidance Value 2.7 ng/L)
    - MW-6A Duplicate
      - PFOS: 3.14 ng/L (Guidance Value 2.7 ng/L)
    - MW-9
      - PFOS: 5.89 ng/L (Guidance Value 2.7 ng/L)
  - VOCs: Minimal detections with no exceedances.
  - SVOCs: [Note: NYS DOH MCL is 1 ug/L – values depicted in bold below also exceed the NYS DOH MCLs for public drinking water. NYSDEC Guidance Values are listed below]
    - MW-6A
      - 1,4-Dioxane: **1.57 ug/L** (Guidance Value 0.35 ug/L)
    - MW-6A Duplicate:
      - 1,4-Dioxane: **1.63 ug/L** (Guidance Value 0.35 ug/L)

- Metals:
  - MW-1
    - Manganese: 0.387 mg/L (Guidance Value 0.3 mg/L)
  - MW-7
    - Manganese: 4.08 mg/L (Guidance Value 0.3 mg/L)
    - Iron: 10.5 mg/L (Guidance Value 0.3 mg/L)
    - Sodium: 27.1 mg/L (Guidance Value 20 mg/L)
  - MW-8
    - Manganese: 0.833 mg/L (Guidance Value 0.3 mg/L)
    - Iron: 21.8 mg/L (Guidance Value 0.3 mg/L)
    - Sodium: 25.8 mg/L (Guidance Value 20 mg/L)
    - Aluminum: 10.4 mg/L (Guidance Value 2 mg/L)
    - Lead: 0.0266 mg/L (Guidance Value 0.025 mg/L)
  - MW-8 Duplicate
    - Manganese: 0.753 mg/L (Guidance Value 0.3 mg/L)
    - Iron: 18.7 mg/L (Guidance Value 0.3 mg/L)
    - Sodium: 26.2 mg/L (Guidance Value 20 mg/L)
    - Aluminum: 9.34 mg/L (Guidance Value 2 mg/L)

- Cyanide: No detectable concentrations.

- PCBs: No detectable concentrations.

- Herbicides: No detectable concentrations.

- Pesticides: No detectable concentrations.

- **Surface Water Samples**

  - PFAS: [Note: NYS DOH MCL is 10 ng/L – values depicted in bold below also exceed the NYS DOH MCLs for public drinking water. NYSDEC Guidance Values are listed below]
    - SS-1
      - PFOS: 4.83 ng/L (Guidance Value 2.7 ng/L)
    - SS-3
      - PFOA: **15.4 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: **40.3 ng/L** (Guidance value 2.7 ng/L)
    - SS-3 Duplicate
      - PFOA: **20.9 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: **49 ng/L** (Guidance value 2.7 ng/L)
    - SS-4
      - PFOS: 9.4 ng/L (Guidance value 2.7 ng/L)
    - SS-5
      - PFOA: 7.89 ng/L (Guidance Value 6.7 ng/L)
      - PFOS: 2.83 ng/L (Guidance Value 2.7 ng/L)
    - BR-SS
      - PFOA: **15.5 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: **18.9 ng/L** (Guidance value 2.7 ng/L)
    - Leachate Sump
      - PFOA: **81.6 ng/L** (Guidance Value 6.7 ng/L)
      - PFOS: **192 ng/L** (Guidance value 2.7 ng/L)

  - VOCs: Minimal detections with no exceedances.

- SVOCs: [Note: NYS DOH MCL is 1 ug/L – values depicted in bold below also exceed the NYS DOH MCLs for public drinking water. NYSDEC Guidance Values are listed below]
  - SS-3
    - Bis(2-ethylhexyl)phthalate: 11.4$^{(B*)}$ ug/L (Guidance Value 5 ug/L)

      B - Analyte was found in the associated batch blank; therefore, it's likely from laboratory contamination.

      * - SS-3 duplicate sample results were 3.31$^{(B)}$ ug/L.
    - 1,4-Dioxane: 0.576 ug/L (Guidance Value 0.35 ug/L)
  - SS-3 Duplicate
    - 1,4-Dioxane: 0.496 ug/L (Guidance Value 0.35 ug/L)
  - SS-5
    - Benz(a)anthracene: 0.0588 ug/L (Guidance Value 0.002 ug/L)
    - Benzo(B)fluoranthene: 0.0588 ug/L (Guidance Value 0.002 ug/L)
  - BR-SS
    - 1,4-Dioxane: 0.576 ug/L (Guidance Value 0.35 ug/L)
  - Leachate Sump
    - 1,4 Dioxane 2.4 ug/l (Guidance Value 0.35 ug/l)
- Metals
  - SS-3:
    - Aluminum: 2.19 mg/L (Guidance Value 2 mg/L)
    - Iron: 7.2 mg/L (Guidance value 0.3 mg/L)
    - Manganese: 1.01 mg/L (Guidance value 0.3 mg/L)
    - Sodium: 127 mg/L (Guidance Value 20 mg/L)
  - SS-3 Duplicate:
    - Aluminum: 8.21 mg/L (Guidance Value 2 mg/L)
    - Cobalt: 0.0118 mg/L (Guidance Value 0.005 mg/L)
    - Iron: 26.1 mg/L (Guidance Value 0.3 mg/L)
    - Lead: 0.039 mg/L (Guidance Value 0.025 mg/L)
    - Manganese: 1.85 mg/L (Guidance Value 0.3 mg/L)
    - Sodium: 114 mg/L (Guidance Value 20 mg/L)
    - Vanadium: 0.0147 (Guidance Value 0.014 mg/L)

- SS-5:
  - Aluminum: 23.8 mg/L (Guidance Value 2 mg/L)
  - Cobalt: 0.0193 mg/L (Guidance Value 0.005 mg/L)
  - Iron: 65.4 mg/L (Guidance Value 0.3 mg/L)
  - Lead: 0.0861 mg/L (Guidance Value 0.025 mg/L)
  - Manganese: 1.41 mg/L (Guidance Value 0.3 mg/L)
  - Selenium: 0.0156[(B)] (Guidance Value 0.01 mg/L)

    B - Analyte was found in the associated batch blank; therefore, it's likely from laboratory contamination.
  - Sodium: 39 mg/L (Guidance Value 20 mg/L)
  - Vanadium: 0.0812 (Guidance Value 0.014 mg/L)

- Cyanide: No detectable concentrations.
- PCBs: No detectable concentrations.
- Herbicides: No detectable concentrations.
- Pesticides: No detectable concentrations.

- **QA/QC Samples**
  - PFAS field blank results indicated no detectable concentrations.
  - Trip blank results indicated no detectable concentrations that were in excess of respective guidance values.
  - Rinse blank results indicated no detectable concentrations that were in excess of respective guidance values.
  - Duplicate samples were generally similar to parent samples, with exception to metals analysis in which there was some variation which could be attributed to suspended sediment/ elevated turbidity (refer to the summaries above).
  - MS/MSD samples generally reflected consistency in the overall analytical process; however, there were some low-bias, high bias and non-directional bias (poor reproducibility) recoveries flagged in the lab reports for the MS/MSD data.

Figure 4 provides a map that depicts analytical groundwater exceedances and Figure 5 depicts analytical surface water exceedances. Tables that provide detailed summaries of the analytical data are provided in Appendix G; refer specifically to Tables 1 through 14 and 29 through 36 for a groundwater, surface water, field blank, trip blank and rinse blank results. Analytical laboratory reports are provided in Appendix H. Laboratory ASP Category B deliverables are provided in Appendix I.

E. Soil & Sediment Sampling Protocols, Analysis & Results

A total of eight soil samples, two from each of the four new monitoring well locations, were collected from a split spoon sampler. All encountered soils were properly characterized, and the findings were recorded in a field logbook. Three soil samples (one from each new well location for MW-8, MW-9 and MW-11) were collected from the ground surface from a depth of 0 -2" deep. No sample was collected at new well MW-10 at this interval because it consisted of asphaltic pavement; however, in lieu of this sample interval, a sample was collected from MW-10 from the soil-garbage (s/g) interface (10 feet below surface grade) since garbage was encountered when this new well was being installed, unlike the other new well locations. Four additional soil samples (one from each new well location for MW-8, MW-9, MW-10 and MW-11) were collected from a depth of 2" – 12" deep (composite samples). A soil-groundwater interface was not encountered at any of the new well installation locations (all four new wells were installed into bedrock).

Soils selected for sampling were obtained in a manner consistent with NYSDEC sample collection protocols. With exception to the soil-garbage interface for MW-10, none of the soils exhibited visual or olfactory evidence of contamination. Dedicated stainless steel serving spoons and disposable nitrile gloves were used at each sample location. When samples were obtained, they were subsequently deposited into a dedicated stainless-steel bowl for mixing, until the material was homogenized, prior to filling the sample containers.

Sediment samples were collocated with surface water samples and were obtained in a manner consistent with NYSDEC sample collection protocols. Decontaminated stainless-steel spoons, bowls, and/or dedicated disposable nitrile gloves were used at each sample location. When the samples were obtained, they were deposited into a stainless-steel bowl for mixing, until the material was homogenized, prior to filling the sample containers.

Based on historic NYSDEC investigation work completed to date, PFAS are a concern for this site and for downgradient residential receptors, therefore, all soil and sediment samples collected as part of this investigation were analyzed for PFAS. Additionally, at least 20% of all samples collected per each media category (e.g. soil & sediment), was analyzed for the "full suite" of parameters as listed below:

- Soil: MW-8 @ 0 – 2" and 2 – 12" (down-gradient) & MW-10 @ 2-12" and soil/garbage interval (up-gradient)
- Sediment: SD-3 (down-gradient) & SD-5 (up-gradient)

Refer to Figure 2 for a depiction of the sample locations.

<u>Full Suite</u>

- USEPA Target Compound List (TCL) & CP-51 Volatile Organic Compounds (VOCs), including tentatively identified compounds (TICs) via USEPA Method 8260
- USEPA TCL & CP-51 Semi-volatile Organic Compounds (SVOCs), including TICs via USEPA Method 8270
- Target Analyte List (TAL) Metals via USEPA Methods 6010 / 7470 / 7471
- Cyanide via USEPA Method 9012

- PCBs via USEPA Method 8082
- Pesticides via USEPA Method 8081
- Herbicides via USEPA Method 8151
- 1,4-Dioxane via USEPA Method 8270 (reporting limit of 0.1 mg/kg must be achieved)
- PFAS via USEPA Method 537m (isotope dilution); reporting limit not to exceed 0.5 ug/kg for PFOS/PFOA and be as close as possible to 0.5 ug/kg for all other PFAS

QA/QC Samples

QA/QC samples were also collected and analyzed as indicated in the approved Quality Assurance Project Plan (QAPP), a summary of which is provided below:

- Soil Sampling:
  - Duplicates
    - PFAS & 1,4-Dioxane: MW-8 (2-12")
    - VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides: MW-8 (2-12")
  - Matrix Spike / Matrix Spike Duplicates
    - PFAS & 1,4-Dioxane: MW-8 (2-12")
    - VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides: MW-8 (2-12")
  - PFAS Field Blanks: Each day PFAS samples were collected.
  - Trip Blanks: Each day VOC samples were collected.

  Note: Rinse Blanks were not applicable.

- Sediment Sampling:
  - Duplicates
    - PFAS & 1,4-Dioxane: SD-3
    - VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides: SD-3
  - Matrix Spike / Matrix Spike Duplicates
    - PFAS & 1,4-Dioxane: SD-3
    - VOC / SVOC / TAL Metals / Cyanide / PCBs / Herbicides / Pesticides: SD-3
  - PFAS Field Blanks: Each day PFAS samples were collected.
  - Trip Blanks: Each day VOC samples were collected.

  Note: Rinse Blanks were not applicable.

Regulatory Standards, Criteria, Guidance Values

Soil sample results were compared to New York State Department of Environmental Conservation (NYSDEC) Title 6 NYCRR Part 375-6, Table 375-6.8 (a & b): "Protection of Public Health", Unrestricted Use Soil Cleanup Objectives (SCOs). Additionally, the following were used as guidance values per NYSDEC Sampling and Assessment of PFAS Guidance document dated 6/2021:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	1.1	3.7

Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC and are discussed generally in this report. Sediment sample results for other analytes were compared to values described in NYSDEC Screening and Assessment of Contaminated Sediment guidance document dated June 24, 2014, prepared by the Division of Fish, Wildlife and Marine Resources – Bureau of Habitat.

Summary of Results with Exceedances

- **Soil**
  - PFAS:
    - MW-10 (soil/garbage interface @ 10' below surface grade):
      - PFOS: 1.79 ug/kg (Guidance value 0.88 ug/kg)
    - MW-11 (2 – 12")
      - PFOS: 1.61 ug/kg (Guidance value 0.88 ug/kg)

    Note: Neither of the above values exceed the Residential Use Guidance value of 8.8 ug/kg for PFOS, or the established Protection of Groundwater Guidance value of 3.7 ug/kg for PFOS.

  - VOCS: Minimal detections with no exceedances.

- SVOCS: Minimal detections with no exceedances.

- Metals:
  - MW-10 (soil/garbage interface @ 10' below surface grade):
    - Lead: 68.4 mg/kg (Guidance Value 63 mg/kg – Unrestricted Use)

      Note: Guidance value for protection of ecological resources is also 63 mg/kg. Guidance value for protection of groundwater is 450mg/kg. Guidance value for restricted residential use is 400 mg/kg. Natural background concentrations of selected analytes in rural New York State surface soils (August 2005) lists lead at 15,000 mg/kg.

    - Zinc: 1,140 mg/kg (Guidance Value 109 mg/kg – Unrestricted Use)

      Note: Guidance value for protection of ecological resources is also 109 mg/kg. Guidance value for protection of groundwater is 2,480 mg/kg. Guidance value for restricted residential use is 2,200 mg/kg. Natural background concentrations of selected analytes in rural New York State surface soils (August 2005) lists zinc at 125 to 250 mg/kg.
- Cyanide: No detectable concentrations.
- PCBs: Minimal detections (at MW-10 soil/garbage interface @ 10' below surface grade only) with no exceedances.
- Herbicides: No detectable concentrations.
- Pesticides: Minimal detections with no exceedances.

<u>The following Sediment Summary is for: Low Risk Contaminants, Potential Risk Contaminants, High Risk Contaminants & Detectable PFAS Results</u>

- **Sediment**
  - PFAS: Note: Preliminary target clean-up levels have not been established for PFAS in sediment therefore the summary below is of detectable PFAS results.
    - PFOA:
      - BR-SD: 0.661 ug/kg.
    - PFOS:
      - SD-3: 5.85 ug/kg
      - SD-3 Duplicate: 10.2 ug/kg
      - SD-4: 0.552 ug/kg

- BR-SD: 3.05 ug/kg

- N-E+FOSAA
  - SD-3: 2.18 ug/kg
  - SD-3 Duplicate: 2.05 ug/kg
- PFtrDA
  - SD-1: 0.413 ug/kg
  - SD-3 Duplicate: 0.527 ug/kg
- PFBA
  - SD-3 Duplicate: 0.643 ug/kg

Note: SD-3 is located in a ponding area where transported sediment would have time to settle; therefore, is expected that contaminant concentrations would be higher in this location as compared to the other locations where less settling occurs.

- VOCs: Minimal detections with no exceedances.

- SVOCs: Only one detectible concentration at SD-3 that was not an exceedance.

- Metals:
  - SD-3:
    - Arsenic: 17.4 mg/kg (Guidance Value Class B: 10-33 mg/kg - Potential Risk)
    - Chromium, Total: 12.5 mg/kg (Guidance Value Class A: <43 mg/kg - Low Risk)
    - Copper: 19 mg/kg (Guidance Value Class A: <32 mg/kg - Low Risk)
    - Lead: 22 mg/kg (Guidance Value Class A: <36 mg/kg – Low Risk)
    - Mercury: 0.0733 mg/kg (Guidance Value Class A: <0.2 mg/kg – Low Risk)
    - Nickel: 20.8 mg/kg (Guidance Value Class A: <23 mg/kg – Low Risk)

    Note: SD-3 is in a ponding area where transported sediment would have time to settle; therefore, is reasonable to expect that contaminant concentrations would be higher in this location as compared to the other locations.
  - SD-3 Duplicate:
    - Arsenic: 37.9 mg/kg (Guidance Value Class C: >33 mg/kg - **High Risk**)
    - Chromium, Total: 25.7 mg/kg (Guidance Value Class A: <43 mg/kg - Low Risk)
    - Copper: 41.3 mg/kg (Guidance Value Class B: 32-150 mg/kg - Potential Risk)
    - Lead: 47.8 mg/kg (Guidance Value Class B: 36-130 mg/kg – Potential Risk)
    - Nickel: 43.6 mg/kg (Guidance Value Class B: 23-49 mg/kg – Potential Risk)

    Note: SD-3 is located in a ponding area where transported sediment would have time to settle; therefore, is reasonable to expect that contaminant concentrations would be higher in this location as compared to the other locations.
  - SD-5:
    - Arsenic: 10.1 mg/kg (Guidance Value Class B: 10–33 mg/kg – Potential Risk)
    - Chromium, Total: 25.1 mg/kg (Guidance Value Class A: <43 mg/kg - Low Risk)
    - Copper: 32.9[(B)] mg/kg (Guidance Value Class B: 32-150 mg/kg - Potential Risk)

      B - Analyte was found in the associated batch blank; therefore, it's likely from laboratory contamination.
    - Lead: 45.8 mg/kg (Guidance Value Class B: 36-130 mg/kg – Potential Risk)
    - Nickel: 33.4 mg/kg (Guidance Value Class B: 23-49 mg/kg – Potential Risk)

- Cyanide: No detectable concentrations.

- PCBs: No detectable concentrations.

- Herbicides: No detectable concentrations.
- Pesticides: No detectable concentrations.

- **QA/QC Samples**
  - PFAS field blank results indicated no detectable concentrations.
  - Trip blank results indicated no detectable concentrations that were in excess of respective guidance values.
  - Rinse blank results indicated no detectable concentrations that were in excess of respective guidance values.
  - Duplicate samples had a tendency to have higher concentrations of contaminants when compared to the parent samples, which could be attributed to insufficient sediment mixing (refer to the summaries above).
  - MS/MSD samples generally reflected consistency in the overall analytical process; however, there were some low-bias, high-bias and non-directional bias (poor reproducibility) recoveries flagged in the lab reports for the MS/MSD data.

Figure 6 provides a map that depicts sediment results for analytes detected at potential-risk and high-risk levels as well as detectable concentrations of PFAS. Figure 7 depicts analytical soil exceedances. Tables that provide detailed summaries of the analytical data are provided in Appendix G; refer specifically to Tables 15 through 36 for soil, sediment, field blank, trip blank and rinse blank results. Analytical laboratory reports are provided in Appendix H. Laboratory ASP Category B deliverables are provided in Appendix I.

F. Equipment Decontamination

Dedicated disposable sampling items were used when possible (e.g. nitrile gloves, HDPE tubing, dedicated stainless steel bowls and spoons, etc.). Re-useable sampling items (e.g. the Horiba® water quality meter, submersible pump, etc.) were decontaminated between each location with an appropriate cleaning solution (Alconox®), followed by two rinses with PFAS-free potable water. One rinse blank per day was collected when groundwater samples were being collected. Rinse blank results indicated no detectable concentrations that were in excess of respective guidance values.

G. Laboratory Reporting and Data Validation

NYSDEC ASP Category B data deliverable packages were provided by York, the ELAP certified laboratory selected to provide analytical services for this project. York laboratory holds ELAP certification for PFAS analysis in drinking water by EPA Method 537, 537.1, ISO25101 or 533 and all environmental samples

analyzed for PFAS for this project were analyzed using 537 modified (York lab NY Certification Nos. 10854 & 12058).

Data usability summary reports (DUSR) were provided by Michael K. Perry, Chemist, EDU Environmental Data Useability, Dansville, NY, an independent data validator to confirm that the analytical data meets the project specific criteria for data quality and use. Data validation services were conducted in accordance with Appendix 2B of DER-10 (Guidance for Data Deliverables and the Development of Data Usability Summary Reports).

In summary, the DUSR reports indicate that "All analytical results reported by the laboratory are considered valid and acceptable except results that have been qualified as rejected, "R". Results qualified as estimated "J", or as non-detects, "U", are considered useable for the purpose of evaluating water and/or soil quality". However, these qualifiers indicate that the accuracy and/or precision of the analytical result is questionable."

Based on a review of the 11 DUSR reports the following provides a summary of the useability per the NYSDEC-approved data validator:

- SDG 22K0506 – 98.9% Useable [8 Water & 4 Sediment]
- SDG 22K0569 – 98.8% Useable [4 Water & 2 Sediment]
- SDG 22K0808 – 100% Useable [4 Water]
- SDG 22K0955 – 99% Useable [4 Water]
- SDG 22K1073 – 99.1% Useable [5 Water]
- SDG 22K1209 – 98.2% Useable [4 Water & 2 Soil]
- SDG 22K1211 – 100% Useable [1 Soil]
- SDG 22K1212 – 100% Useable [1 Water & 2 Soil]
- SDG 22K1279 – 99.5% Useable [5 Water & 4 Soil]
- SDG 22L0279 – 95.7% Useable [6 Water]
- SDG 22L 0342 – 100% Useable [4 Water]

Average Data Useability: 99.02%

Copies of the NYSDEC ASP Category B data deliverable packages are provided in Appendix I. Copies of the DUSR reports are provided in Appendix J.

H. Surveying

Land surveying services were provided by a NYS licensed land surveyor from Brinnier & Larios, P.C. following the field investigation work to obtain all sample location coordinates as well as monitoring well elevations. Horizontal surveying data was tied into the New York State Plane Coordinate System, Eastern Zone via NAD83, and vertical elevations were based on NAVD88. Survey coordinates were converted to decimal degrees based on the WGS84 datum for input into the NYSDEC electronic data deliverable (EDD) system – EQuIS database. Locations surveyed were added to the Site Plan, provided as Figure 2.

I. Community Air Monitoring Plan (CAMP)

A CAMP was prepared and implemented during the investigation fieldwork. The intent of the CAMP was to provide a measure of protection for the downwind community (i.e., off-Site receptors such as residences and businesses) and on-Site workers not directly involved with the investigation work activities during the field investigation.

A MiniRAE 3000 photo-ionization detector (PID) was used to conduct real-time volatile organic compound (VOC) monitoring during investigation activities. PID readings remained at 0.0 ppm throughout the entire investigation. Additionally, VOCs were continuously monitored for at the upwind and downwind perimeter of the immediate investigation work area with PIDs. The VOC monitors were equipped with a telemetry unit capable of transmitting real-time VOC data to the field representative and project manager. The VOC monitoring instrument was capable of displaying and transmitting the STEL or 15-minute averaging period, which was compared to the NYSDOH Generic Community Air Monitoring Plan action levels for VOCs. Ambient air concentrations of total organic vapors at the upwind and downwind perimeters of the work area did not exceed 5 parts per million (ppm) above background for the 15-minute average during any of the field investigation activities.

Three (3) real-time particulate monitors capable of continuously measuring PM-10 and capable of integrating over a period of 15 minutes (or less) were utilized during ground-disturbing investigation activities. The instruments were placed at temporary monitoring stations based on the prevailing wind direction each workday, one (1) upwind and two (2) downwind of the designated work areas. Each particulate monitor was equipped with a telemetry unit capable of transmitting real-time particulate data to the field representative and project management. The particulate monitoring instruments were capable of displaying and transmitting the short-term exposure limit (STEL) or 15-minute averaging period, which were compared to the NYSDOH Generic Community Air Monitoring Plan action levels for particulates. The instruments were programmed to alarm at preset action levels. Downwind PM-10 particulate levels did not exceed 0.1 milligrams per cubic meter (mg/m3) over background (upwind perimeter) for any 15-minute period, and airborne dust was not observed leaving the work area at any time.

Dust suppression techniques (PFAS-free water applications) were utilized regardless during drilling activities as a precautionary measure to protect site personnel, to reduce the potential for contaminant migration, and to reduce heat generated by drilling equipment.

Calibration of the VOC and PM-10 instrumentation occurred each day it was used in accordance with each of the equipment manufacturer's calibration and quality assurance requirements. A copy of the CAMP monitoring results is provided as Appendix K.

It should be noted that there were temporary periods where the cellular service was interrupted which resulted in temporary lapses in CAMP monitoring.

IV. Conclusion & Recommendations

Per the NYSDEC New York State Inactive Landfill Initiative which provides a comprehensive plan to address priority solid waste sites for potential impacts on drinking water quality, May 2021, "…the presence of PFAS compounds in groundwater at inactive landfill facilities is relatively common." Based on NYSDEC investigation work completed at 262 landfills under the above program up to December 2020, 77% of them were found to have PFAS present at levels in excess of established New York State Department of Health Maximum Contaminant levels (MCL) of 10 ng/L. Based on this historical NYSDEC investigation work at inactive landfills, PFOA & PFOS concentrations in general were found to range from 13.6 ng/L to 11,624 ng/L in groundwater and 1,4-dioxane levels were found to range from 1 to 1,300 ug/L.

The Town of Hurley Landfill was included in the NYSDEC's investigation and found to have exceedances of MCLs in on-site groundwater wells and in downgradient drinking water based on sampling data collected. The highest level found during the initial NYSDEC assessment was 330 ng/L. To address the contamination in downgradient drinking water, Point of Entry Treatment (POET) systems were installed on the impacted wells or bottled water was supplied to the affected residents. The NYSDEC further recommended that additional monitoring and a Site Characterization investigation be conducted at the landfill.

According to NYSDEC guidance document DER-10, the purpose of a Site Characterization Investigation is to "determine whether a site poses little or no threat to public health and the environment or if it poses a threat and whether the threat requires further investigation." This investigation was conducted for this purpose.

2022 Site Characterization Investigation

As part of this 2022 Site Characterization investigation groundwater was sampled and analyzed from four additional bedrock monitoring wells installed on-site (two on the north side of the landfill, one on the east side of the landfill and one on the south side of the landfill) and six existing bedrock monitoring wells. Sampling and analyses were also conducted for surface water and co-located sediment samples as well as soils at select locations.

Summary of Results

The following provides a summary of Site Characterization investigation results:

- PFAS RESULTS – GROUNDWATER & SURFACE WATER

  Based on this characterization investigation, PFOA and PFOS were detected in both groundwater and in surface water samples at several locations above their respective guidance value of 10 ng/L (NYSDEC DOW TOGs 1.1.1 guidance value); and, in one down-gradient monitoring well location, specifically MW-4, at levels quite a bit over 10 ng/L in groundwater (MW-4 PFOA @ 147 ng/L & PFOS @ 286 ng/L). Concentrations of PFOA and PFOS in groundwater at MW-4 exceeded concentrations detected in the Leachate Sump sample analyzed (Leachate Sump PFOA @ 81.6 ng/L & PFOS @ 192

ng/L). The Leachate Sump is in close proximity to MW-4's location, as well as surface sample SS-3's location, and only down-gradient surface water samples at locations SS-3 and BR-SS exhibited PFOA and PFOS at concentrations in excess of 10 ng/L, the highest being 49 ng/L (PFOS) from the duplicate sample collected from the SS-3 location (SS-3 is in a ponding area within the stream near the north end of the landfill).

- OTHER PARAMETER ANALYSIS - GROUNDWATER

  With regard to the other analyses completed for both up-gradient and down-gradient groundwater locations, there were minimal detections of VOCs (no exceedances of any guidance value) and no detectable concentrations of cyanide, PCBs, herbicides or pesticides. One SVOC, that being 1,4-dioxane was detected at down-gradient well MW-6A (the primary sample @ 1.57 ug/L as well as the duplicate @ 1.63 ug/L) at concentrations that were in excess of both the recently established NYSDEC guidance value of 0.35 ug/L (NYSDEC DOW TOGs 1.1.1 guidance value) and the NYS DOH MCL for public drinking water of 1 ug/L. One metal, manganese was detected in excess of its established NYSDEC guidance value in both up-gradient and down-gradient well locations, while several metals, including manganese, iron, sodium, aluminum and lead, were detected in on-site groundwater in down-gradient wells at concentrations in excess of their respective NYSDEC guidance values, which suggests that the landfilled materials are having an impact on groundwater quality in the area.

- OTHER PARAMETER ANALYSIS – SURFACE WATER

  Other analyses completed for both up-gradient and down-gradient surface water locations indicated minimal detections of VOCs (no exceedances of any guidance value) and no detectable concentrations of cyanide, PCBs, herbicides or pesticides. SVOC 1,4-dioxane was detected in two down-gradient surface water sample locations (SS-3 @ 0.576 ug/L , SS-3 Duplicate @ 0.496 ug/L & BR-SS @ 0.576 ug/L) at concentrations in excess of the recently established NYSDEC guidance value of 0.35 ug/L (NYSDEC DOW TOGs 1.1.1 guidance value). Concentrations of 1,4-dioxane detected in down-gradient surface water samples was below its respective established NYS DOH MCL for public drinking water of 1 ug/L. The up-gradient surface water sample had two different SVOC constituents detected, benz(a)anthracene (0.0588 ug/L) and benzo(b)fluoranthene (0.0588 ug/L) in excess of their respective NYSDEC guidance values of 0.002 ug/L. Down-gradient sample location SS-3 also had bis(2-ethylhexyl)phthalate detected in excess of its respective NYSDEC guidance value, however, this analyte was also detected in the laboratory batch blank, and the result was flagged as being from laboratory contamination. Several metals, including aluminum, cobalt, iron, lead, manganese, sodium and vanadium were detected in excess of their established NYSDEC guidance values in both up-gradient and down-gradient well locations. Since the direction of groundwater flow has been determined to be towards the west (towards the stream), it appears that the landfilled materials are also having an impact on surface water quality in the area. Selenium was also detected in the up-gradient surface sample location in excess of its respective NYSDEC guidance value, however, this

analyte was also detected in the laboratory batch blank, and the result was flagged as being from laboratory contamination.

- SOILS

  Soils data indicated PFAS concentrations of PFOS at the soil-garbage interface level at MW-10 (1.79 ug/kg) and at the 2 – 12" interval for MW-11 (1.61 ug/kg) which were in excess of the respective NYSDEC guidance value of 0.88 ug/kg. Neither of the above values exceeded established NYSDEC residential use guidance value of 8.8 ug/kg nor the established NYSDEC Protection of Groundwater guidance value of 3.7 ug/kg. Other analyses completed for soil sampling locations and intervals indicated minimal detections of VOCs, SVOCs and PCBs (no exceedances of any guidance value & the low-level PCB detection was at the soil-garbage interface interval for MW-10 only) and no detectable concentrations of cyanide, herbicides or pesticides. Two metals were detected in the soil-garbage interface interval for MW-10 at levels in excess of NYSDEC's Unrestricted Use guidance values and NYSDEC's protection of ecological resource guidance values. Lead was detected 68.4 mg/kg and zinc was detected at 1,140 mg/kg. The concentration of lead detected from MW-10 does not exceed the NYSDEC guidance value for protection of groundwater (450 mg/kg) nor the restricted residential use guidance value of 400 mg/kg. The concentration of zinc detected from MW-10 does not exceed the NYSDEC guidance value for protection of groundwater (2,480 mg/kg) nor the restricted residential use guidance value of 2,200 mg/kg.

- SEDIMENT

  Although preliminary target clean-up levels have not been established for PFAS in sediment, for discussion purposes, sediment data indicated detectable PFAS concentrations (specifically PFOA & PFOS) at down-stream/ down-gradient locations (SD-3, SD-4 & BR-SD) which generally appeared to be low, with the highest concentration being from the SD-3 (ponding area) location (10.2 ug/kg for PFOS). Three other PFAS (N-E+Fosaa, PFtrDA & PFBA) were also detected in down-stream/ down-gradient sediment sampling location SD-3, with the highest concentration being 2.18 ug/kg for N-E+Fosaa. One up-gradient (separate stream channel from SD-3, SD-4, SD-5 and BR-SD) sediment sampling location (SD-1) also had a low level, detectable concentration of PFtrDA of 0.413 ug/kg. Other analyses completed for sediment sampling locations (which were co-located with surface water sampling locations) indicated minimal detections of VOCs & SVOCs (no exceedances of any guidance value) and no detectable concentrations of cyanide, PCBs, herbicides and pesticides. Only 1 metal, arsenic (37.9 mg/kg) was detected at a concentration in excess of its respective "Class C" – High Risk, NYSDEC guidance value (>33 mg/kg) in down-stream / down-gradient sediment location SD-3. Potential Risk ("Class B") metals detected in down-stream / down-gradient sediment sample location SD-3 (and its duplicate) as well as up-stream sediment sample location SD-5 include: arsenic, copper, lead, and nickel. The copper detection for sediment sample location SD-5 is flagged by the lab as also being present in the batch blank and therefore is likely a result of laboratory contamination. It should also be noted that SD-3 is located in a portion of the stream that is subject

to ponding which allows transported sediment from up-stream locations to settle, therefore it is reasonable to expect that contaminant concentrations would be higher in the SD-3 sediment sampling location, as compared to up-stream or down-stream locations which do not pond.

Per the approved work plan and NYSDEC guidelines for sampling and analyzing PFAS dated June 2021, PFAS are to be further assessed and considered as potential contaminants of concern in groundwater or surface water if they are detected in any water sample at or above 10 ng/L (ppt) and are determined to be attributable to the site.

Given the direction of localized, shallow groundwater flow (towards the northwest) as well as existing hydrogeologic determinations for the site (a former quarry with waste deposited directly onto bedrock in close proximity to the groundwater table, the source of the PFAS contamination in downstream surface water & downgradient groundwater does appear to be attributed to the site.

Analytical results for metals and 1,4-dioxane in downgradient samples of ground and surface water above NYS DOH established MCLs or NYSDEC guidance values also suggest that the landfill is having an impact on surface water and groundwater quality in the area. Furthermore, PFAS sampling results from 2018 to 2020 which were provided by NYSDEC for down-gradient residential wells, confirms that PFAS contamination extends beyond the property boundary of the site, and therefore, confirms that a public health exposure pathway also exists.

Site Operations that Potentially Caused Contamination

As indicated previously, the site historically operated as a municipal solid waste landfill from the early 1960s to 1996 and the types of waste that are documented as having been disposed of at this landfill site included municipal solid waste, C&D debris, brush, logs, and metal filings from Numrich Arms in West Hurley.

“Environmental releases associated with the use of PFAS-containing products are primarily related to management of solid waste (for example, disposal of used items in a municipal solid waste (MSW) landfill or other legacy disposal areas)” per the Interstate Technology and Regulatory Council (ITRC). The ITRC also indicates that municipal solid waste landfills are known to contain PFAS-associated waste which include consumer products-wastes that were treated with hydrophobic, stain-resistant coatings.

Other common consumer products that are discarded at municipal landfills which can contribute to PFAS entering the environment include, but are not limited to, discarded shampoo and cleaning product bottles, cosmetics, non-stick pans and bakeware, molded fiber plates/bowls, and fast-food packaging (e.g. single use food containers that are water and grease resistant such as pizza boxes, polystyrene/polystyrene foam trays or packaging). Other ways for contaminants from landfills, including PFAS and 1,4-Dioxane, to enter the surrounding environment, include escaping via uncontrolled leachate pathways.

Natural background soil conditions as well as waste that was historically accepted when the landfill was active, which included wastes from the Numrich Arms facility in West Hurley is likely be contributing to the elevated metal results. Numrich Arms is a facility that is located in West Hurley which initially began as a small retail gun store back in the early 1950’s and which grew into one of the world’s largest supplier of firearm parts and accessories.

Additionally, the prior use of the site had been a rock quarry in which municipal waste was deposited directly on the bedrock surface in an area where groundwater is located in close proximity to the waste mass. Quarry sites are known to be associated with greater potential for off-site migration.

Recommendations

Moving forward, since PFAS have been detected in both groundwater and surface water in samples from the site at or above 10 ng/L (ppt) and are determined to be attributable to the site based on this Site Characterization investigation, as well as there being known adverse impacts to down-gradient drinking water based on historical sampling data collected/provided by the NYSDEC, the following is recommended:

- A Remedial Investigation Feasibility Study (RIFS) be completed to identify potential containment and/or treatment options for the contaminant source (e.g. using in-situ colloidal activated carbon to trap PFAS on-site within the landfill or other measure as determined appropriate by the study) as well as a means for reducing the amount of leachate generated.
- Additional PFAS sampling and analysis be conducted for the landfill and for potentially impacted downgradient private water supply wells to monitor trends and to determine if additional interim remedial measures (e.g. POET systems) are warranted.

V. References

C&A Site Characterization Work Plan, October 2022

June 1998 NYSDEC Division of Water Technical and Operational Series (DOWTOGS) No. 1.1.1 and Subsequent Memorandum & Addendums

NYSDEC 6 NYCRR Part 375, Environmental Remediation Programs, Subparts 375-1 to 375-4 & 375-6, Effective December 14, 2006

NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) June 2021 Guidance

NYSDEC Screening and Assessment of Contaminated Sediment, June 24, 2014

DER-10 /Technical Guidance for Site Investigation and Remediation, NYSDEC Program Policy, May 2010

CDM Smith Final Site Characterization Investigation Report, Saugerties Town Landfill Site, October 2021

Interstate Technology Regulatory Council (ITRC) PFAS – Per- and Polyfluoroalkyl Substances, Section 2.6 PFAS Releases to the Environment, Updated September 2021. (https:// pfas-1.itrcweb.org/2-6-pfas-releases-to-the-environment/)

NYSDEC, New York State Inactive Landfill Initiative, Comprehensive Plan to Address Priority Solid Waste Sites for Potential Impacts on Drinking Water Quality, May 2021

Morris Associates Engineering Consultants, Application for Municipal Landfill Closure Grant Program for Hurley Sanitary Landfill, June 1991

Lawler, Matusky & Skelly Engineers, Hydrogeological Investigation of the Hurley Landfill, June 1991

Crawford & Associates, Construction Certification Report for Town of Hurley Landfill Closure, Ulster County,October 1996

APPENDIX A: Pre-Existing Monitoring Well Completion Logs & Soil Boring Logs from 1991 Installations

APPENDIX B:
Environmental Database Records Search

APPENDIX C: PFAS-FREE DRILLING & EQUIPMENT RINSE WATER

APPENDIX D: SOIL BORING & MW COMPLETION LOGS
NEW WELLS MW-8, MW-9, MW-10 & MW-11

APPENDIX E:
WATER QUALITY LOGS

APPENDIX F: 2022 LEACHATE SUMP SAMPLING RESULTS

APPENDIX G: DATA SUMMARY TABLES

APPENDIX H:
ANALYTICAL LABORATORY REPORTS

APPENDIX I:
LABORATORY ASP
CATEGORY B DELIVERABLE

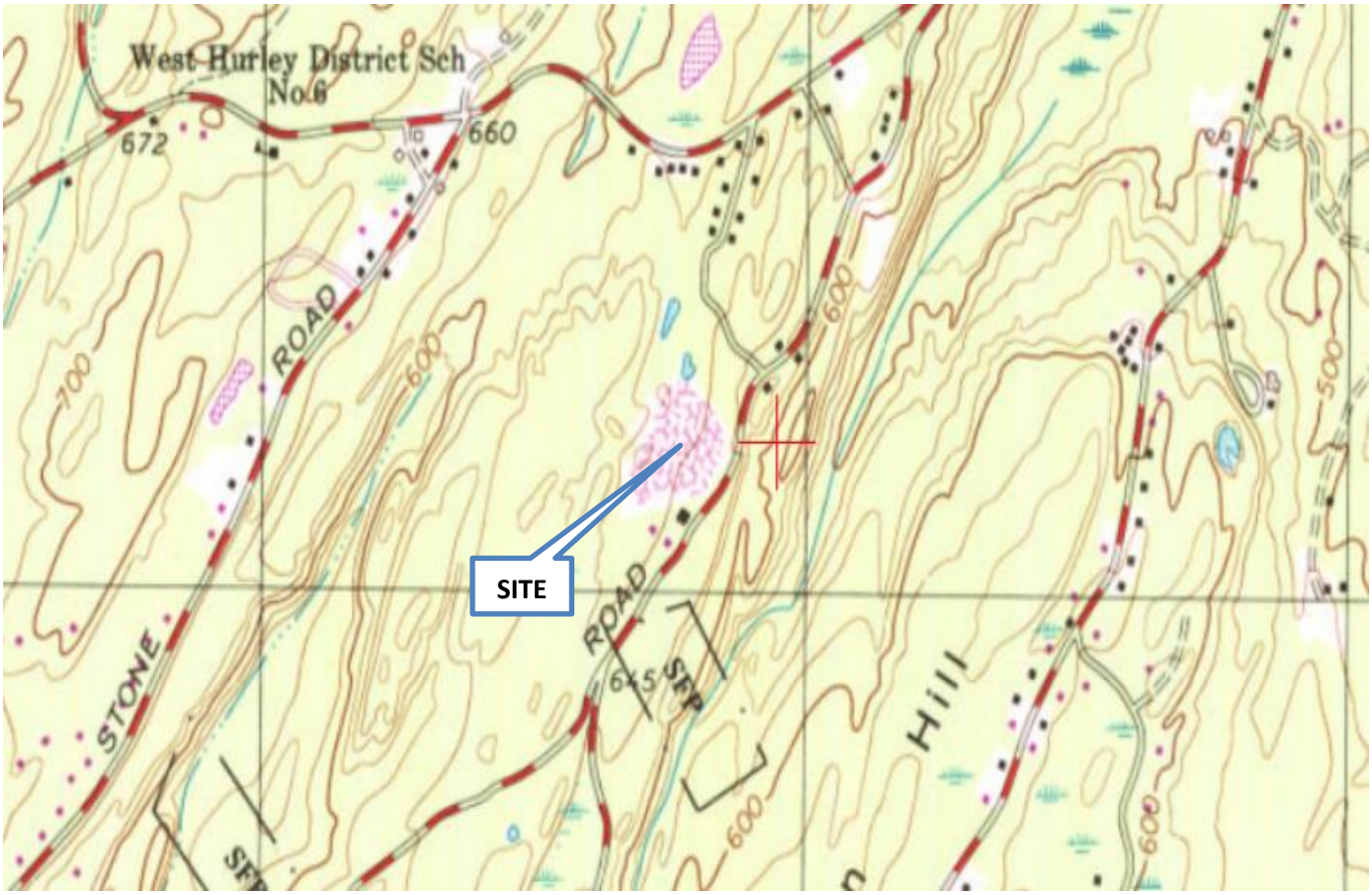
APPENDIX J: DATA USEABILITY SUMMARY REPORTS [DUSR]

APPENDIX J: CAMP DATA



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FIGURES



SITE LOCATION TOPOGRAPHIC MAP

U.S. Geological Survey, 7.5 Minute Series

N

1035 Dug Hill Road

TOWN OF HURLEY *ULSTER COUNTY*

Crawford & Associates Engineering, PC
4411 Route 9. • Suite 200 • Hudson, NY 12534

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General Site Location

DATE	DRAWN BY: KP	H:\WORK\5447.0.\REPORTS	
4/14/22	DESIGNED BY: KP		
SCALE *NTS*	CHECKED BY: DV	C&A JOB # *5447.0*	Drawing: *FIGURE 1*
	APPROVED BY: KP		

BREAKLINE A

LANDS OF TOWN OF HURLEY

EXISTING SURFACE LEACHATE COLLECTION AREA WITH LEACHATE SUMP

2 -EXISTING 2,000 GALLON LEACHATE TANKS

MONITORING WELL 8 (MW-8)

HISTORICAL SURFACE SAMPLE LOCATION 2 (NO LONGER PRESENT)

SURFACE WATER AND SEDIMENT SAMPLE LOCATION (SS-3 & SD-3)

2- EXISTING (INACTIVE) 1,000 GALLON LEACHATE TANKS

EXISTING 10,000 GALLON LEACHATE TANK

COLLIER ROAD

MW-4 (WELL RELOCATED AND INSTALLED ON AUGUST 20, 1996)

EXISTING STOMWATER SYSTEM

MONITORING WELL 3 (MW-3)

LANDFILL ACCESS ROAD

SURFACE WATER AND SEDIMENT SAMPLE LOCATION 4 (SS-4 & SD-4)

MONITORING WELL 9 (MW-9)

MONITORING WELL 6A

MONITORING WELL 6B

HURLEY LANDFILL

LANDFILL ACCESS ROAD

EXISTING LEACHATE COLLECTION SYSTEM

APPROXIMATE LOCATION OF EROSION CONTROL CHANNEL

MONITORING WELL 7 (MW-7)

PROPERTY BOUNDARY FROM TAX MAP

MONITORING WELL 5 (MW-5)

APPROXIMATE LOCATION OF GAS VENTING TRENCH

SURFACE WATER AND SEDIMENT SAMPLE LOCATION (SS-1 & SD-1)

MONITORING WELL 10 (MW-10)

APPROXIMATE LOCATION OF SOIL GAS PROBE TYP.

DUG HILL ROAD

SURFACE WATER AND SEDIMENT SAMPLE LOCATION (SS-5 & SD-5)

MONITORING WELL 1 (MW-1)

HISTORICAL MONITORING WELL 2 (NO LONGER PRESENT)

MONITORING WELL 11 (MW-11)

OVERALL SITE PLAN

SCALE 1" = 100'

NOTES:
1. SITE TOPOGRAPHY AND FEATURES FROM BRINNIER AND LARIOS, P.C. MAY 2006 STORMWATER RETROFIT PROJECT.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS- ULSTER COUNTY PARCEL ACCESS
3. VIEW BREAK LINE FOR OFFSITE SURFACE WATER AND SEDIMENT SAMPLE LOCATION BRS (BRS-SS & BRS-SD)
4. 2022 LANDFILL CHARACTERIZATION INVESTIGATION SAMPLING SURVEYED ON JANUARY 17, 2023 BY BRINNIER & LARIOS
5. NEW MONITORING WELLS THAT WERE INSTALLED IN 2022 ARE HIGHLIGHTED IN BOLD (MW-8, MW-9, MW-10, MW-11).

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISTING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- ST — EXISTING CULVERT W/ FLARED END SECTION
- ST — EXISTING STORMWATER LINE
- CB — EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING ROAD EDGE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- (W) MONITORING WELL
- (S) EXISTING SURFACE SAMPLE LOCATIONS
- E — EXISTING ELECTRIC
- OE — EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE

BREAKLINE A- OFFSITE SAMPLING LOCATION



GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

REV #	DESCRIPTION	DATE	BY
4	JUNE 27, 2023 NYSDEC COMMENTS	7/14/23	LD
3	MONITORING WELL ADDITION & SURVEY DATA	3/13/23	MP
2	REV. BASED ON NYSDEC COMMENTS DATED 9/12/22	9/30/22	TF
1	REV. BASED ON NYSDEC COMMENTS DATED 6/29/22	7/25/22	TF

HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

SITE PLAN

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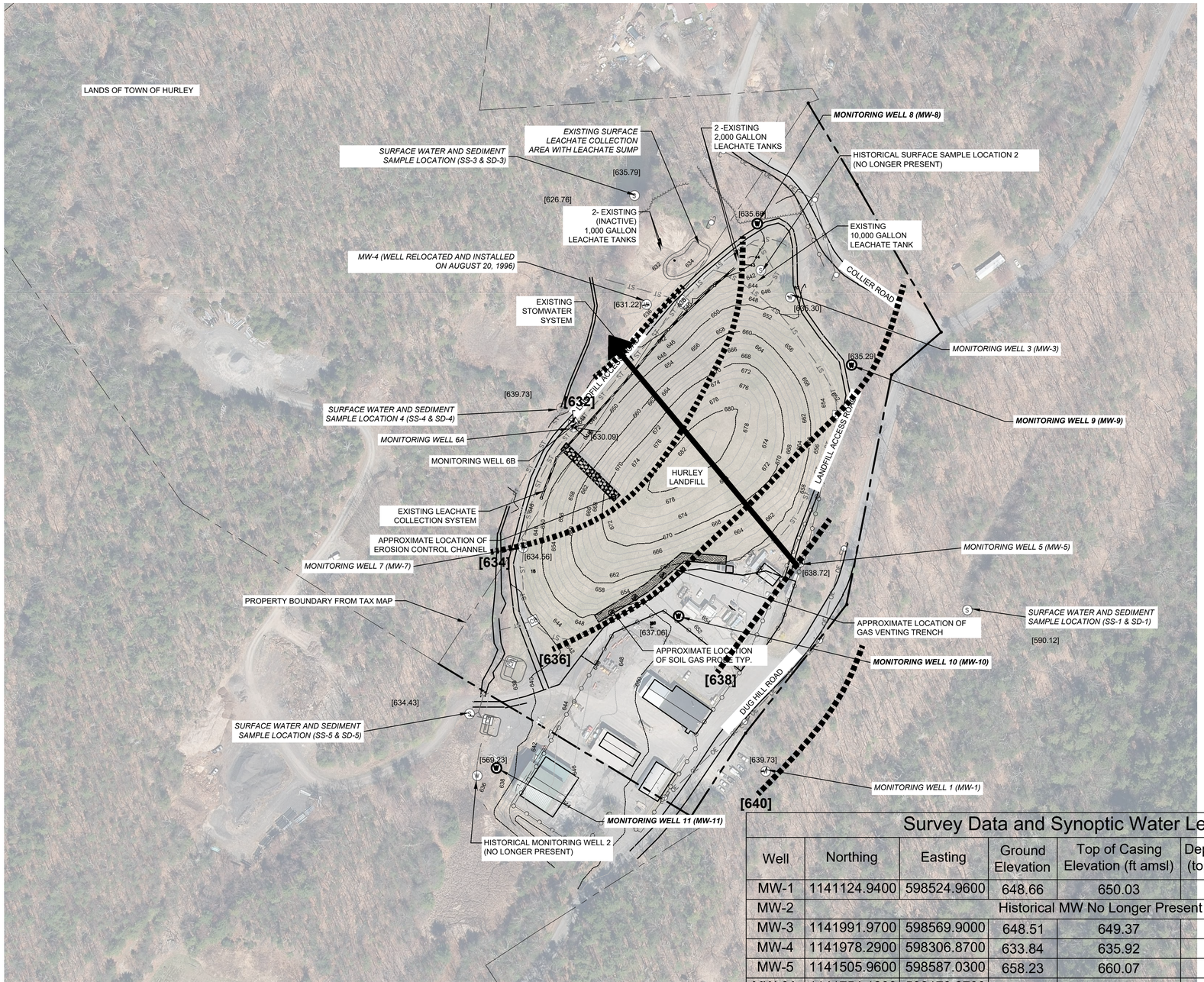
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		CHECKED BY:	C&A
		APPROVED BY:	C&A

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C&A JOB # 5447.00

DRAWING: FIGURE 2



GROUNDWATER CONTOUR MAP

SCALE 1" = 100'

LEGEND

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- EXISTING SURFACE SAMPLE LOCATIONS
- EXISTING ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE
- mg/kg — MILLIGRAMS PER LITER
- GROUNDWATER FLOW DIRECTION
- [639.73] GROUNDWATER CONTOUR ELEVATION DATA

BREAKLINE A - OFFSITE SAMPLING LOCATION



Survey Data and Synoptic Water Levels

Well	Northing	Easting	Ground Elevation	Top of Casing Elevation (ft amsl)	Depth to Water (top of casing)	Water Level Elevation (ft amsl)
MW-1	1141124.9400	598524.9600	648.66	650.03	10.30	639.73
MW-2	Historical MW No Longer Present					
MW-3	1141991.9700	598569.9000	648.51	649.37	14.07	635.30
MW-4	1141978.2900	598306.8700	633.84	635.92	4.70	631.22
MW-5	1141505.9600	598587.0300	658.23	660.07	21.35	638.72
MW-6A	1141754.1200	598173.8700	643.58	645.89	15.80	630.09
MW-7	1141533.3100	598081.0300	644.44	645.21	10.65	634.56
MW-8	1142125.1400	598510.5800	639.18	640.91	5.25	635.66
MW-9	1141868.1400	598682.1100	656.07	657.59	22.30	635.29
MW-10	1141395.5100	598316.5400	650.06	650.06	13	637.06
MW-11	1141130.9800	598031.9800	639.40	641.23	72	569.23

SURVEY DATA & SYNOPTIC WATER LEVEL NOTES:
Water level measurements collected November 2022.

ACRONYMS
amsl - above mean sea level
ft - feet

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
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3. 2022 LANDFILL CHARACTERIZATION INVESTIGATION LOCATIONS SAMPLING SURVEYED ON JANUARY 17, 2023 BY BRINNIER & LARIOS.
4. LEACHATE SUMP ELEVATION OBTAINED ON 7/6/22 BY C&A WITH TRIMBLE VX TOTAL STATION.
5. NEW MONITORING WELLS THAT WERE INSTALLED IN 2022 ARE HIGHLIGHTED IN BOLD (MW-8, MW-9, MW-10, MW-11).

REV #	DESCRIPTION	DATE	BY
4	JUNE 27, 2023 NYSDEC COMMENTS	07/14/23	LD
3	MONITORING WELL ADDITION AND SURVEY DATA	02/24/23	JZ/MBM

HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

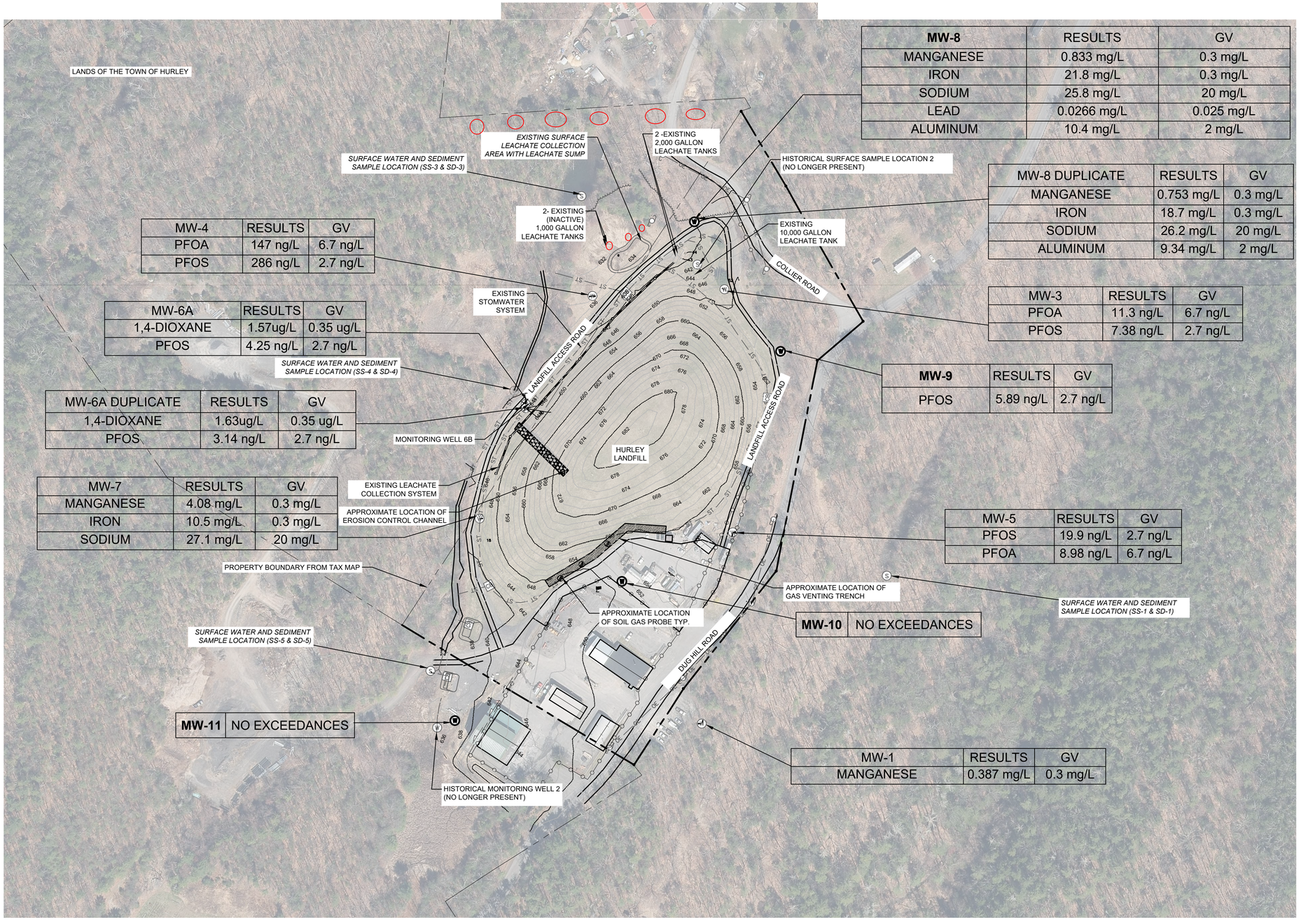
GROUNDWATER CONTOUR MAP

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5/4/2022	DESIGNED BY: RCL	
SCALE	CHECKED BY: C&A	C&A JOB# 5447.00
AS SHOWN	APPROVED BY: C&A	DRAWING: FIGURE 3



MW-8	RESULTS	GV
MANGANESE	0.833 mg/L	0.3 mg/L
IRON	21.8 mg/L	0.3 mg/L
SODIUM	25.8 mg/L	20 mg/L
LEAD	0.0266 mg/L	0.025 mg/L
ALUMINUM	10.4 mg/L	2 mg/L

MW-8 DUPLICATE	RESULTS	GV
MANGANESE	0.753 mg/L	0.3 mg/L
IRON	18.7 mg/L	0.3 mg/L
SODIUM	26.2 mg/L	20 mg/L
ALUMINUM	9.34 mg/L	2 mg/L

MW-4	RESULTS	GV
PFOA	147 ng/L	6.7 ng/L
PFOS	286 ng/L	2.7 ng/L

MW-3	RESULTS	GV
PFOA	11.3 ng/L	6.7 ng/L
PFOS	7.38 ng/L	2.7 ng/L

MW-6A	RESULTS	GV
1,4-DIOXANE	1.57ug/L	0.35 ug/L
PFOS	4.25 ng/L	2.7 ng/L

MW-9	RESULTS	GV
PFOS	5.89 ng/L	2.7 ng/L

MW-6A DUPLICATE	RESULTS	GV
1,4-DIOXANE	1.63ug/L	0.35 ug/L
PFOS	3.14 ng/L	2.7 ng/L

MW-7	RESULTS	GV
MANGANESE	4.08 mg/L	0.3 mg/L
IRON	10.5 mg/L	0.3 mg/L
SODIUM	27.1 mg/L	20 mg/L

MW-5	RESULTS	GV
PFOS	19.9 ng/L	2.7 ng/L
PFOA	8.98 ng/L	6.7 ng/L

MW-10	NO EXCEEDANCES

MW-11	NO EXCEEDANCES

MW-1	RESULTS	GV
MANGANESE	0.387 mg/L	0.3 mg/L

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- (S) EXISTING SURFACE SAMPLE LOCATIONS
- E — EXISTING ELECTRIC
- OE — EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE

mg/kg — MILLIGRAMS PER LITER
ug/kg — NANOGRAMS PER LITER
ug/L — MICROGRAMS PER LITER

BREAKLINE A- OFFSITE SAMPLING LOCATION



OVERALL SITE PLAN

SCALE 1" = 100'

NOTES:
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6. GROUNDWATER SAMPLE RESULTS WERE COMPARED TO NYSDEC DOWTOGS 1.1.1 WATER QUALITY STANDARDS AND GUIDANCE VALUES AND/OR NYSDEC PART 703 GROUNDWATER STANDARDS, INCLUDING SUBSEQUENT MEMORANDA, AS APPROPRIATE.

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

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HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

GROUNDWATER EXCEEDANCES

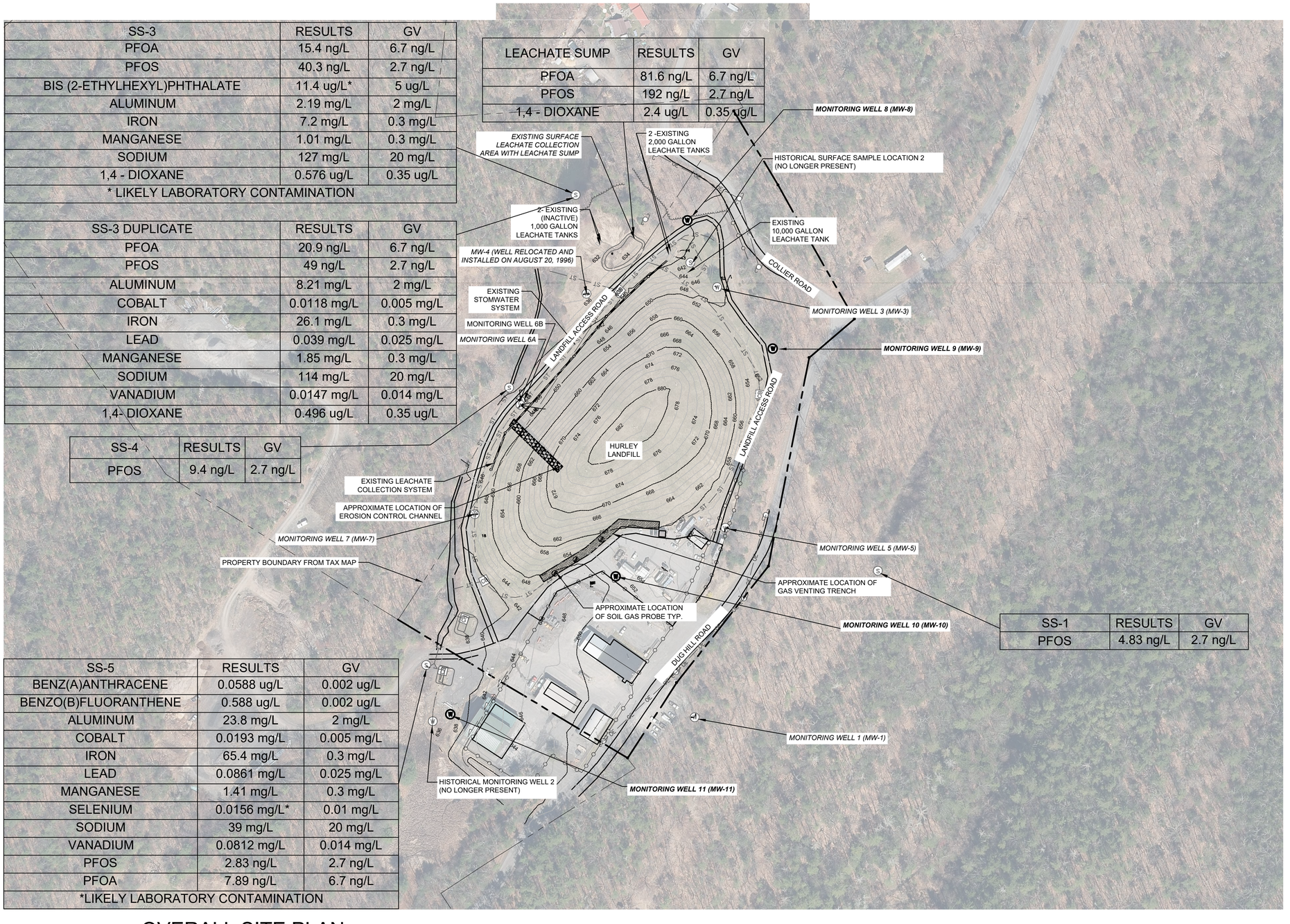
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5/4/2022	DESIGNED BY: RCL	
SCALE	CHECKED BY: C&A	C&A JOB# 5447.00
AS SHOWN	APPROVED BY: C&A	DRAWING: FIGURE 4



SS-3	RESULTS	GV
PFOA	15.4 ng/L	6.7 ng/L
PFOS	40.3 ng/L	2.7 ng/L
BIS (2-ETHYLHEXYL)PHTHALATE	11.4 ug/L*	5 ug/L
ALUMINUM	2.19 mg/L	2 mg/L
IRON	7.2 mg/L	0.3 mg/L
MANGANESE	1.01 mg/L	0.3 mg/L
SODIUM	127 mg/L	20 mg/L
1,4 - DIOXANE	0.576 ug/L	0.35 ug/L
* LIKELY LABORATORY CONTAMINATION		

SS-3 DUPLICATE	RESULTS	GV
PFOA	20.9 ng/L	6.7 ng/L
PFOS	49 ng/L	2.7 ng/L
ALUMINUM	8.21 mg/L	2 mg/L
COBALT	0.0118 mg/L	0.005 mg/L
IRON	26.1 mg/L	0.3 mg/L
LEAD	0.039 mg/L	0.025 mg/L
MANGANESE	1.85 mg/L	0.3 mg/L
SODIUM	114 mg/L	20 mg/L
VANADIUM	0.0147 mg/L	0.014 mg/L
1,4- DIOXANE	0.496 ug/L	0.35 ug/L

LEACHATE SUMP	RESULTS	GV
PFOA	81.6 ng/L	6.7 ng/L
PFOS	192 ng/L	2.7 ng/L
1,4 - DIOXANE	2.4 ug/L	0.35 ug/L

SS-4	RESULTS	GV
PFOS	9.4 ng/L	2.7 ng/L

SS-1	RESULTS	GV
PFOS	4.83 ng/L	2.7 ng/L

SS-5	RESULTS	GV
BENZ(A)ANTHRACENE	0.0588 ug/L	0.002 ug/L
BENZO(B)FLUORANTHENE	0.588 ug/L	0.002 ug/L
ALUMINUM	23.8 mg/L	2 mg/L
COBALT	0.0193 mg/L	0.005 mg/L
IRON	65.4 mg/L	0.3 mg/L
LEAD	0.0861 mg/L	0.025 mg/L
MANGANESE	1.41 mg/L	0.3 mg/L
SELENIUM	0.0156 mg/L*	0.01 mg/L
SODIUM	39 mg/L	20 mg/L
VANADIUM	0.0812 mg/L	0.014 mg/L
PFOS	2.83 ng/L	2.7 ng/L
PFOA	7.89 ng/L	6.7 ng/L
*LIKELY LABORATORY CONTAMINATION		

OVERALL SITE PLAN

SCALE 1" = 100'

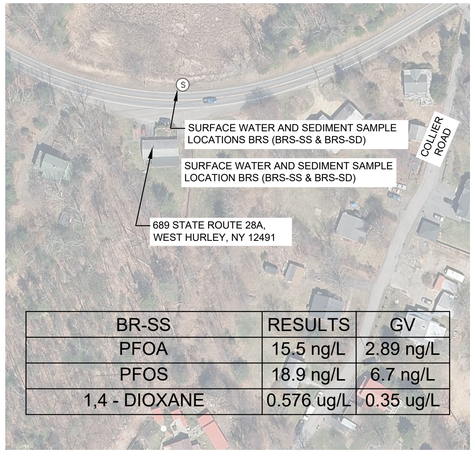
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LEGEND

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- EXISTING UTILITY POLE

mg/kg MILLIGRAMS PER LITER
ug/kg NANOGRAMS PER LITER
ug/L MICROGRAMS PER LITER

BREAKLINE A- OFFSITE SAMPLING LOCATION



BR-SS	RESULTS	GV
PFOA	15.5 ng/L	2.89 ng/L
PFOS	18.9 ng/L	6.7 ng/L
1,4 - DIOXANE	0.576 ug/L	0.35 ug/L

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

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HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

SURFACE WATER EXCEEDANCES

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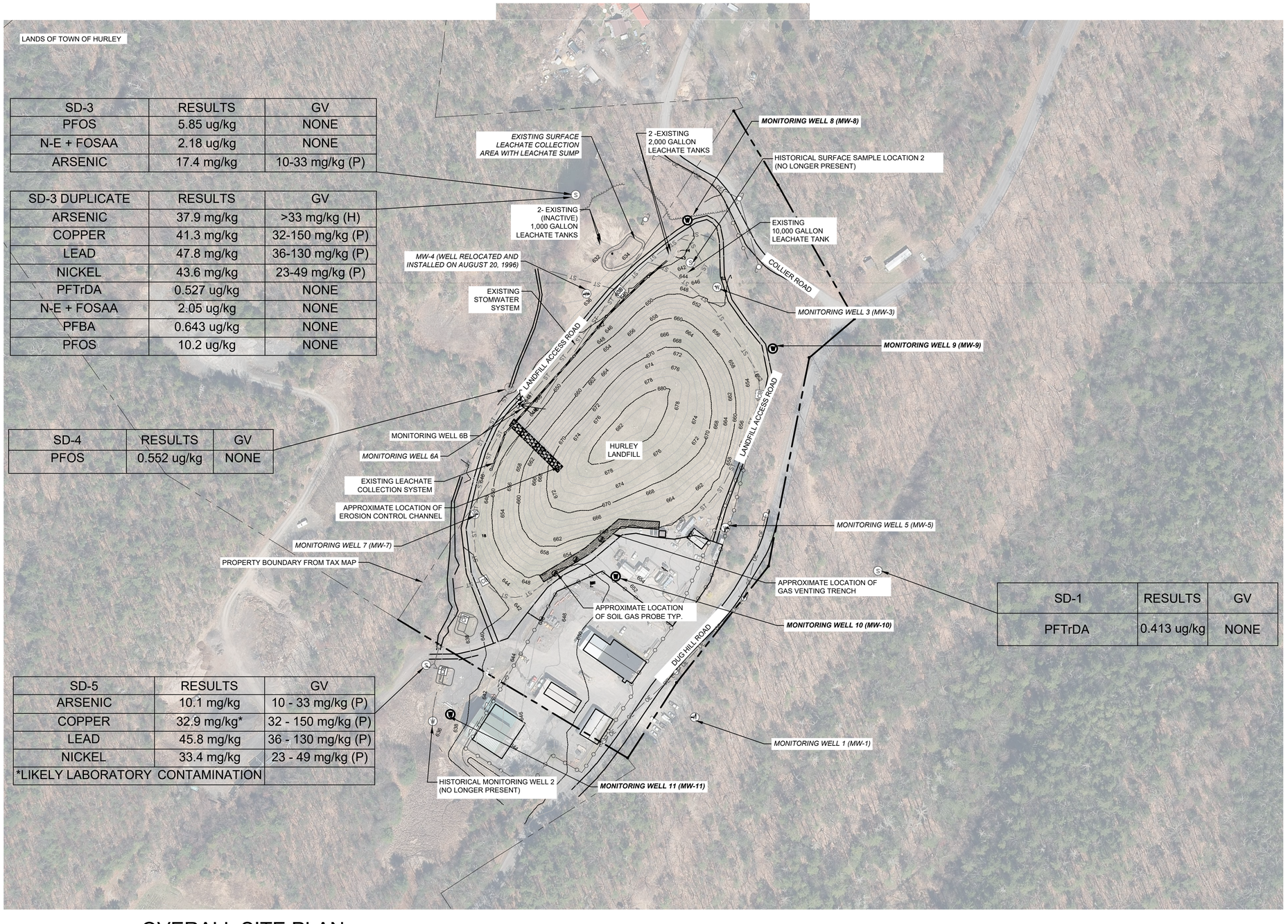
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DESIGNED BY:	RCL
CHECKED BY:	C&A
APPROVED BY:	C&A
C&A JOB#	5447.00
DRAWING:	FIGURE 5

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SD-3	RESULTS	GV
PFOS	5.85 ug/kg	NONE
N-E + FOSAA	2.18 ug/kg	NONE
ARSENIC	17.4 mg/kg	10-33 mg/kg (P)

SD-3 DUPLICATE	RESULTS	GV
ARSENIC	37.9 mg/kg	>33 mg/kg (H)
COPPER	41.3 mg/kg	32-150 mg/kg (P)
LEAD	47.8 mg/kg	36-130 mg/kg (P)
NICKEL	43.6 mg/kg	23-49 mg/kg (P)
PFTrDA	0.527 ug/kg	NONE
N-E + FOSAA	2.05 ug/kg	NONE
PFBA	0.643 ug/kg	NONE
PFOS	10.2 ug/kg	NONE

SD-4	RESULTS	GV
PFOS	0.552 ug/kg	NONE

SD-1	RESULTS	GV
PFTrDA	0.413 ug/kg	NONE

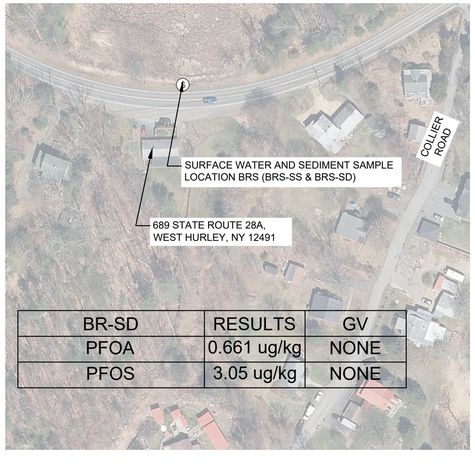
SD-5	RESULTS	GV
ARSENIC	10.1 mg/kg	10 - 33 mg/kg (P)
COPPER	32.9 mg/kg*	32 - 150 mg/kg (P)
LEAD	45.8 mg/kg	36 - 130 mg/kg (P)
NICKEL	33.4 mg/kg	23 - 49 mg/kg (P)
*LIKELY LABORATORY	CONTAMINATION	

LEGEND

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- (S) EXISTING SURFACE SAMPLE LOCATIONS
- E — EXISTING ELECTRIC
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- EXISTING UTILITY POLE

mg/kg MILLIGRAMS PER LITER (P) POTENTIAL RISK
ug/kg NANOGRAMS PER LITER (H) HIGH RISK
ug/L MICROGRAMS PER LITER

BREAKLINE A- OFFSITE SAMPLING LOCATION



BR-SD	RESULTS	GV
PFOA	0.661 ug/kg	NONE
PFOS	3.05 ug/kg	NONE

OVERALL SITE PLAN

SCALE 1" = 100'

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5. ONLY POTENTIAL RISK CONTAMINANTS (P), HIGH RISK CONTAMINANTS (H) AND DETECTABLE CONCENTRATIONS OF PFAS ARE DEPICTED. H AND P CORRESPOND TO SEDIMENT GUIDANCE VALUES CLASS C AND CLASS B, RESPECTIVELY.
6. NEW MONITORING WELLS THAT WERE INSTALLED IN 2022 ARE HIGHLIGHTED IN BOLD (MW-8, MW-9, MW-10, MW-11).
7. SEDIMENT SAMPLE RESULTS WERE COMPARED TO VALUES DESCRIBED IN NYSDEC'S SCREENING AND ASSESSMENT OF CONTAMINATED SEDIMENT GUIDANCE DOCUMENT DATED JUNE 24, 2014, PREPARED BY DIVISION OF FISH, WILDLIFE AND MARINE RESOURCES- BUREAU OF HABITAT FOR ALL ANALYSES EXCEPT PFOS AND PFOA. PRELIMINARY TARGET LEVELS FOR CLEANUP OF PFOS AND PFOA IN SEDIMENT HAVE NOT YET BEEN ESTABLISHED.

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

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HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

SEDIMENT SUMMARY

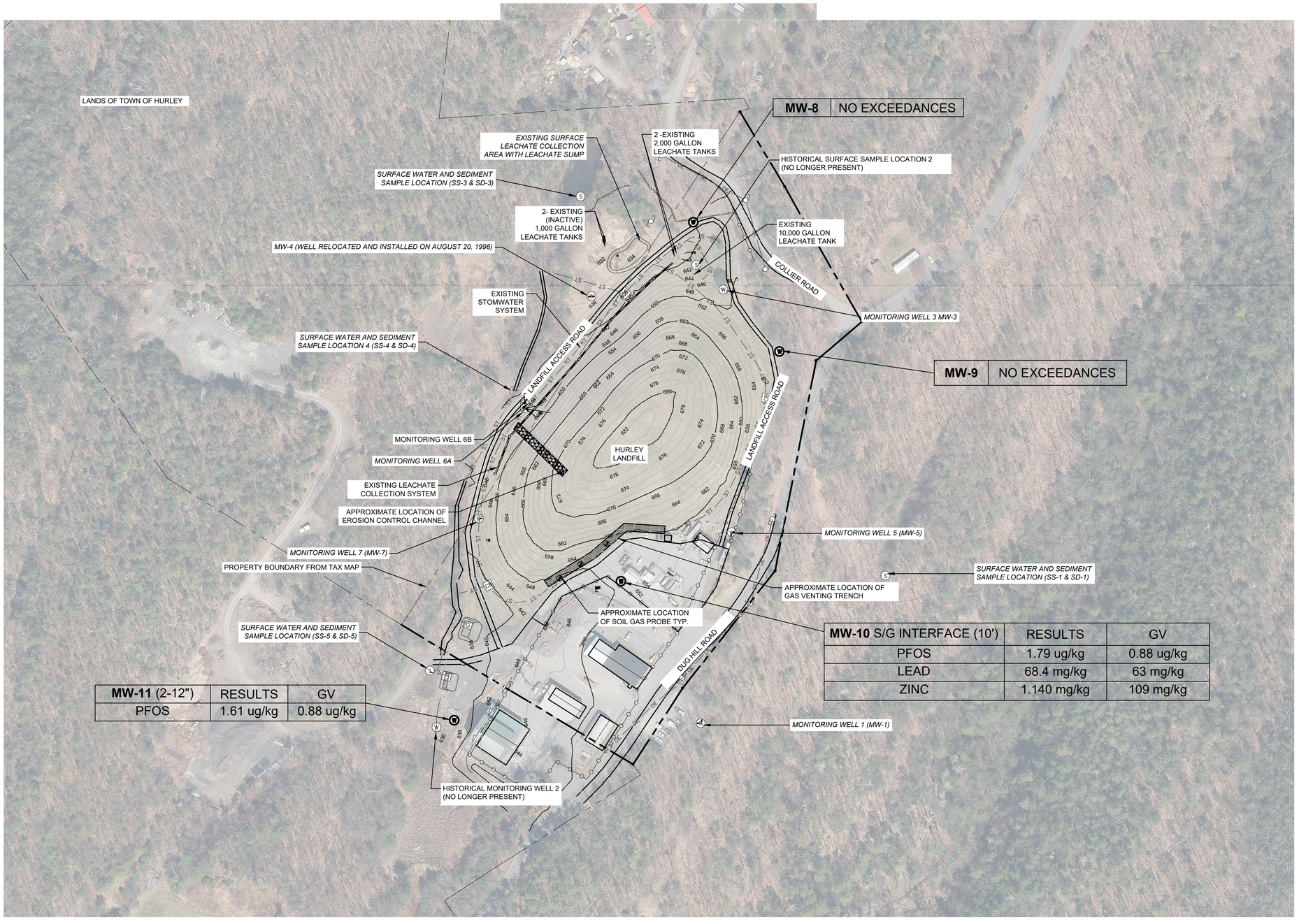
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CRAWFORD & ASSOCIATES
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DATE	DRAWN BY: RCL	H:\WORK\5447.0 Hurley Landfill\Inactive Hazardous Waste Investigation\2WO\5447.0 Figures - UPDATED.dwg
5/4/2022	DESIGNED BY: RCL	C&A JOB# 5447.00
SCALE AS SHOWN	CHECKED BY: C&A	DRAWING: FIGURE 6
	APPROVED BY: C&A	



MW-11 (2-12")	RESULTS	GV
PFOS	1.61 ug/kg	0.88 ug/kg

MW-10 S/G INTERFACE (10')	RESULTS	GV
PFOS	1.79 ug/kg	0.88 ug/kg
LEAD	68.4 mg/kg	63 mg/kg
ZINC	1.140 mg/kg	109 mg/kg

OVERALL SITE PLAN

SCALE 1" = 100'

NOTES:
1. SITE TOPOGRAPHY AND FEATURES FROM BRINNIER AND LARIOS, P.C. MAY 2006 STORMWATER RETROFIT PROJECT.
2. PARCEL BOUNDARIES BASED ON AVAILABLE PUBLISHED TAX MAPS- ULSTER COUNTY PARCEL ACCESS
3. VIEW BREAK LINE FOR OFFSITE SURFACE WATER AND SEDIMENT SAMPLE LOCATION BRS (BRS-SS & BRS-SD)
4. 2022 LANDFILL CHARACTERIZATION INVESTIGATION SAMPLING LOCATIONS SURVEYED ON JANUARY 17, 2023 BY BRINNIER & LARIOS
5. NEW MONITORING WELLS THAT WERE INSTALLED IN 2022 ARE HIGHLIGHTED IN BOLD (MW-8, MW-9, MW-10, MW-11).
6. SOIL SAMPLE RESULTS WERE COMPARED TO NYSDEC TITLE 6 NYCRR PART 375-6, TABLE 375-6.8 (a&b); PROTECTION OF PUBLIC HEALTH, UNRESTRICTED USE SOIL CLEANUP OBJECTIVES. PFOA AND PFOS RESULTS WERE COMPARED TO GUIDANCE VALUES PROVIDED IN NYSDEC SAMPLING AND ASSESSMENT OF PFAS GUIDANCE DOCUMENT DATED 6/2021.

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE FROM TAX MAPS
- EXISTING CONTOUR MINOR INTERVAL
- EXISTING CONTOUR MAJOR INTERVAL
- EXISTING SWALE CENTERLINE
- ST — EXISTING CULVERT W/ FLARED END SECTION
- ST — EXISTING STORMWATER LINE
- CB — EXISTING STORMWATER CATCH BASIN
- EXISTING TREELINE
- EXISTING ROAD EDGE
- EXISTING SIGN
- EXISTING FENCE
- EXISTING CONCRETE
- EXISTING BUILDING
- (W) MONITORING WELL
- (S) EXISTING SURFACE SAMPLE LOCATIONS
- E — EXISTING ELECTRIC
- OE — EXISTING OVERHEAD ELECTRIC
- EXISTING UTILITY POLE

mg/kg — MILLIGRAMS PER LITER
ug/kg — NANOGRAMS PER LITER
ug/L — MICROGRAMS PER LITER
s/g — SOIL/ GARBAGE INTERFACE

BREAKLINE A- OFFSITE SAMPLING LOCATION



GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100 ft.

REV #	DESCRIPTION	DATE	BY
4	JUNE 27, 2023 NYSDEC COMMENTS	7/14/23	LD
3	MONITORING WELL ADDITION & SURVEY DATA	3/13/23	MP
2	REV. BASED ON NYSDEC COMMENTS DATED 9/12/22	9/30/22	TF
1	REV. BASED ON NYSDEC COMMENTS DATED 6/29/22	7/25/22	TF

HURLEY LANDFILL INVESTIGATION

TOWN OF HURLEY — ULSTER COUNTY, NY

SOIL EXCEEDANCES

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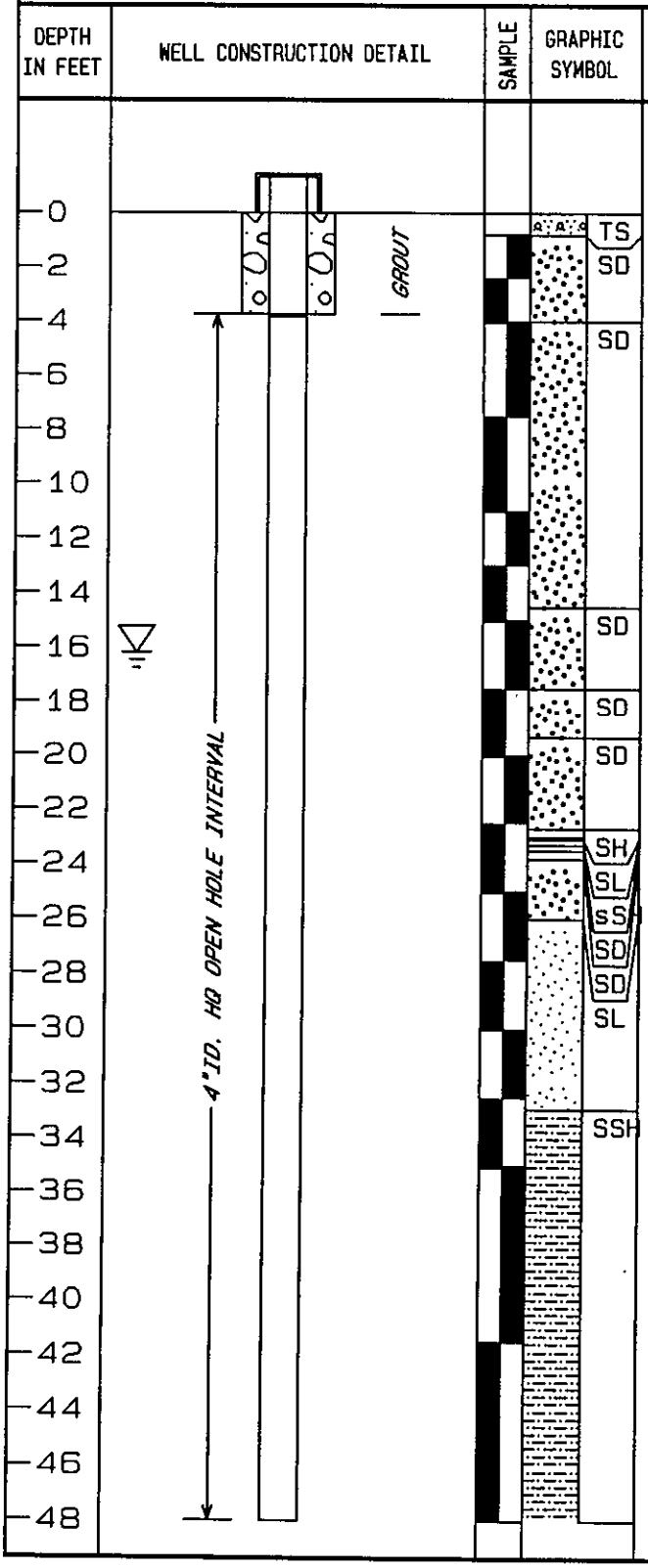
DATE	5/4/2022
SCALE	AS SHOWN
DRAWN BY:	RCL
DESIGNED BY:	RCL
CHECKED BY:	C&A
APPROVED BY:	C&A
C&A JOB#	5447.00
DRAWING:	FIGURE 7

H:\WORK\5447.0 Hurley Landfill\Inactive Hazardous Waste Investigation\2140\5447.0 Figures - UPDATED.dwg

APPENDIX A: Pre-Existing Monitoring Well Completion Logs & Soil Boring Logs from 1991 Installations

WELL LOG FOR: MW-1

Project Name	Hurley Landfill	Total Depth	48.35 ft
Project No.	628-006	Date Drilled	26 Feb 91
Location	SE corner of site, near gate	Well Completion Date	27 Feb 91
Geologist	Dick Donofrio	Date Developed	11 March 91
Surface Elevation	648.34 ft	Top of Casing Elevation	649.79 ft



WELL DATA

Client: Morris Associates
Driller: American Auger drilling ,Inc.
Type of Well: Bedrock
Static Water Level: 16.16
Date: 27 Feb 91
Measuring Point: Below grade
Total Well Depth: 48 ft
Developing Method: Centrifugal pump

DRILLING METHOD:
Type: 6 IN HQ Coring Outer diameter: 6-4 in.
Casing:

SAMPLING METHOD:
Type: cores Diameter: 3.75 in
Weight: Fall: Interval: 5 ft

RISER PIPE LEFT IN PLACE:
Material: PVC schedule 40 Diameter: 4 in.
Length: 4.15 ft. (includes stick-up)
Joint Type:

SCREEN:
Material: Diameter:
Slot Size: Length:
Stratigraphic Unit:

FILTER PACK:
Sand Grade: Amount: Interval:

SEALS (S):
Type: Interval:
Type: Interval:
Type: Concrete Interval: 4-surface

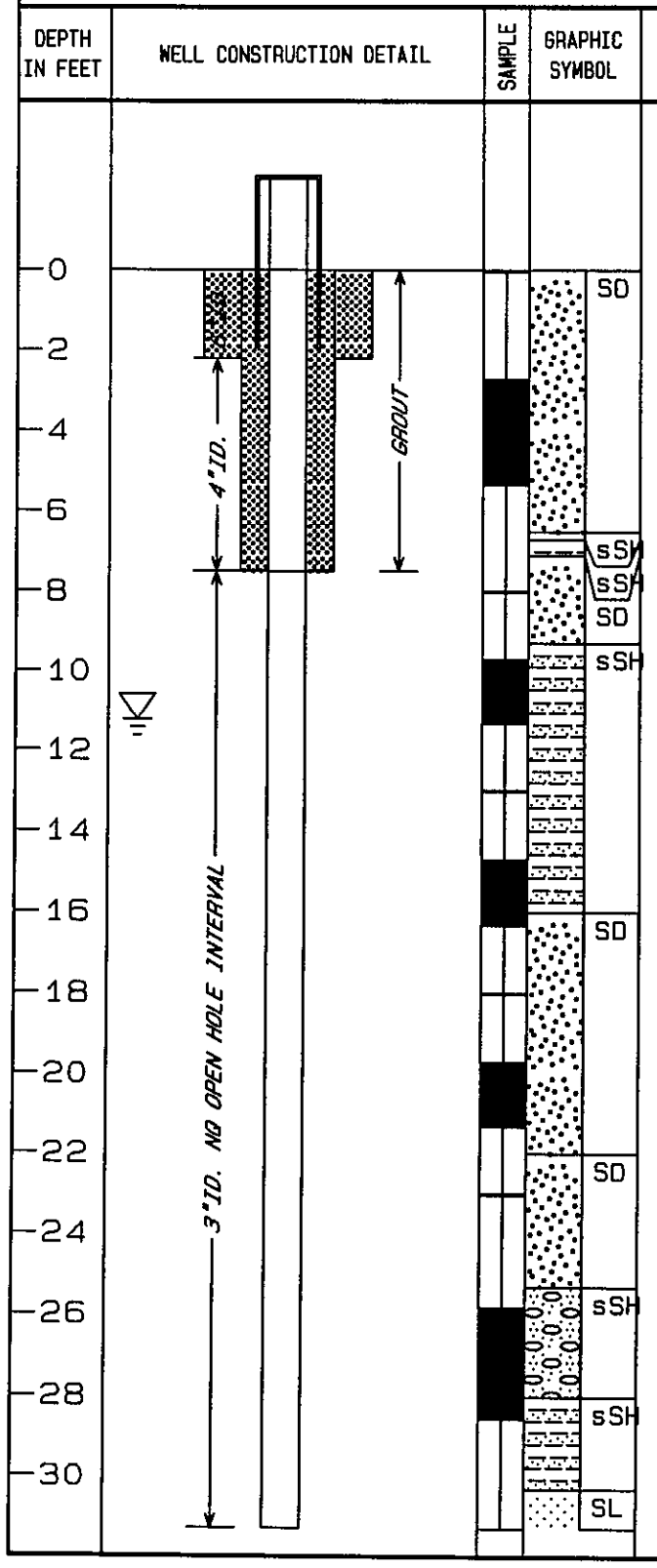
LOCKING CASING: Yes

NOTES:
Well set at 3.73 to 48 ft. with 3.75 in. I.D. borehole and cased from surface to 3.75 ft.

Lawler, Matusky & Skelly Engineers

WELL LOG FOR: MW-3

Project Name	Hurley Landfill	Total Depth	31.3 ft
Project No.	628-006	Date Drilled	7 May 91
Location	West of site.	Well Completion Date	8 May 91
Geologist	Tarik Zarrouk	Date Developed	17 May 91
Surface Elevation	646.66 ft	Top of Casing Elevation	649.06 ft



Client: Morris Associates
Driller: American Auger drilling , Inc.
Type of Well: Bedrock
Static Water Level: 11.25
Date: 9 May 91
Measuring Point: Below grade
Total Well Depth: 31.3 ft
Developing Method: centrifugal pump/ bailer.

DRILLING METHOD:
Type: 6 IN- HQ, NQ Coring — Outer diameter: 6-4-3 in
casing: PVC (0-7.5)

SAMPLING METHOD:
Type: cores — Diameter: 3.75, 2.98 in
Weight: — Fall: — Interval: 5 ft

RISER PIPE LEFT IN PLACE:
Material: PVC schedule 40 — Diameter: 3 in.
Length: 9.9 ft. (includes stick-up)
Joint Type:

SCREEN:
Material: — Diameter:
Slot Size: — Length:
Stratigraphic Unit:

FILTER PACK:
Sand — Grade: — Amount: — Interval:

SEALS (S):
Type: — Interval:
Type: — Interval:
Type: Concrete — Interval: 7.5-surface

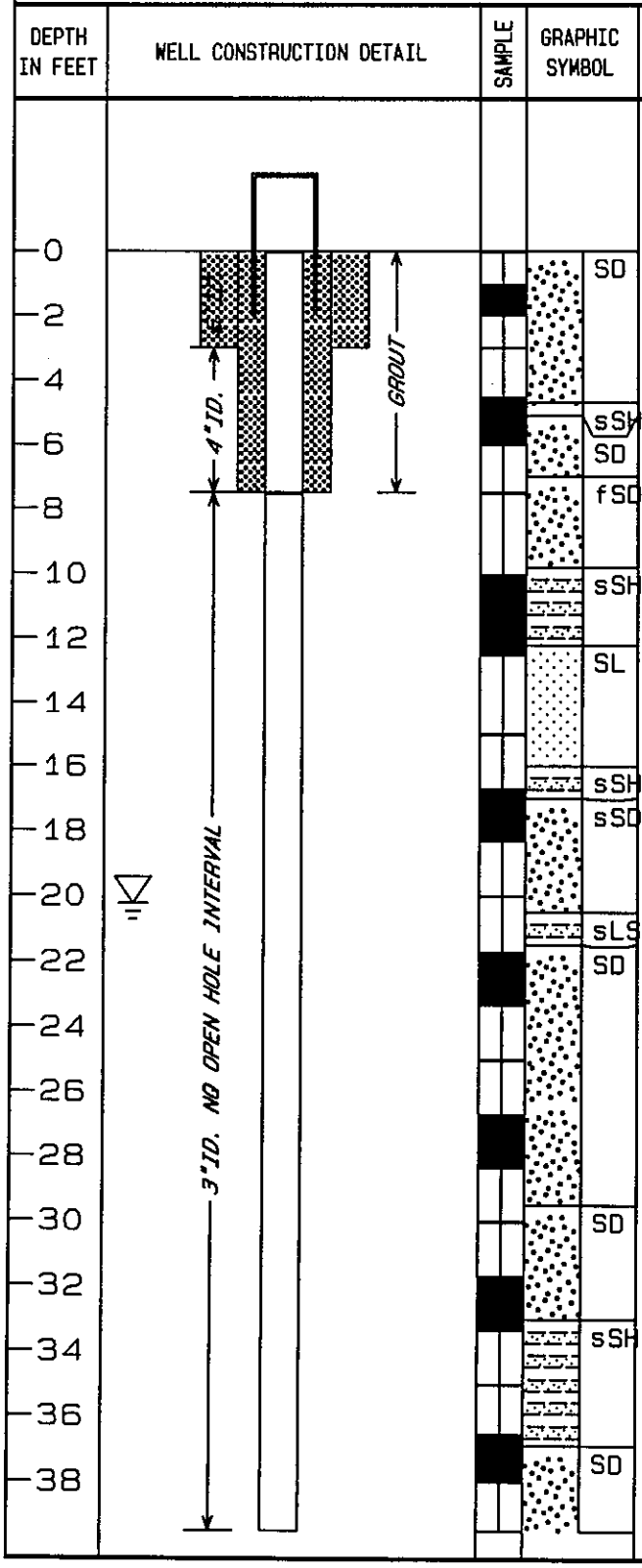
LOCKING CASING: Yes

NOTES:
Hole has different diameter sizes, 6" D from 0-2.2 ft, 4" D from 2.2-7.5 ft., and 3" D from 7.5-31.3 ft.

Lawler, Matusky & Skelly Engineers

WELL LOG FOR: MW-5

Project Name	Hurley Landfill	Total Depth	39.5 ft
Project No.	628-006	Date Drilled	7 May 91
Location	East of site, near Fence.	Well Completion Date	8 May 91
Geologist	Tarik Zarrouk	Date Developed	17 May 91
Surface Elevation	657.45 ft	Top of Casing Elevation	659.85 ft



Client: Morris Associates
Driller: American Auger drilling , Inc.
Type of Well: Bedrock
Static Water Level: 20.25
Date: 7 May 91
Measuring Point: Below grade
Total Well Depth: 39.5 ft
Developing Method: PVC bailer

DRILLING METHOD:
Type: 6 IN- HQ, NQ Coring — Outer diameter: 6-4-3 in
Casing: PVC (0-7.5)

SAMPLING METHOD:
Type: cores — Diameter: 3.75, 2.98 in
Weight: Fall: — Interval: 5 ft

RISER PIPE LEFT IN PLACE:
Material: PVC schedule 40 — Diameter: 3 in.
Length: 9.13 ft. (includes stick-up)
Joint Type:

SCREEN:
Material: — Diameter:
Slot Size: — Length:
Stratigraphic Unit:

FILTER PACK:
Sand Grade: Amount: Interval:

SEALS (S):
Type: — Interval:
Type: — Interval:
Type: Concrete — Interval: 7.5-surface

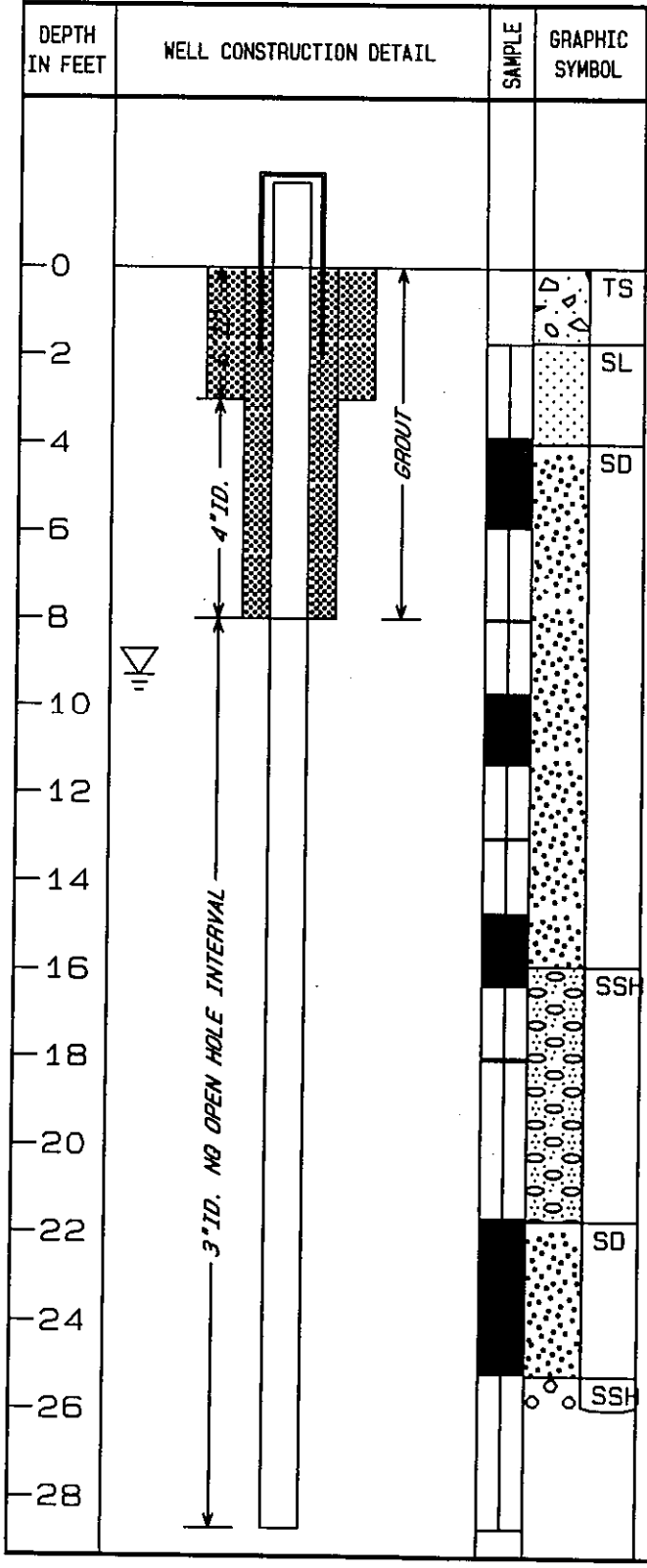
LOCKING CASING: Yes

NOTES:
Hole has different diameter sizes, 6" D from 0-3 ft, 4" D from 3-7.5 ft., and 3" D from 7.5-39.5 ft.

Lawler, Matusky & Skelly Engineers

WELL LOG FOR: MW-6A

Project Name	Hurley Landfill	Total Depth	28.7 ft
Project No.	628-006	Date Drilled	9 May 91
Location	NW of site.	Well Completion Date	13 May 91
Geologist	Tarik Zarrouk	Date Developed	17 May 91
Surface Elevation	640.36 ft	Top of Casing Elevation	642.36 ft



Client: Morris Associates
Driller: American Auger drilling , Inc.
Type of Well: Bedrock
Static Water Level: 9.3 FT
Date: 9 May 91
Measuring Point: Below grade
Total Well Depth: 28.7 ft
Developing Method: Bailer.

DRILLING METHOD:
Type: 6 IN- HQ, NQ Coring — Outer diameter: 6-4-3 in
Casing: PVC (0-8)

SAMPLING METHOD:
Type: cores — Diameter: 3.75, 2.98 in
Weight: Fall: — Interval: 5 ft

RISER PIPE LEFT IN PLACE:
Material: PVC schedule 40 — Diameter: 3 in.
Length: 10 ft. (includes stick-up)
Joint Type:

SCREEN:
Material: — Diameter:
Slot Size: — Length:
Stratigraphic Unit:

FILTER PACK:
Sand Grade: Amount: Interval:

SEALS (S):
Type: — Interval:
Type: — Interval:
Type: Concrete — Interval: 8-surface

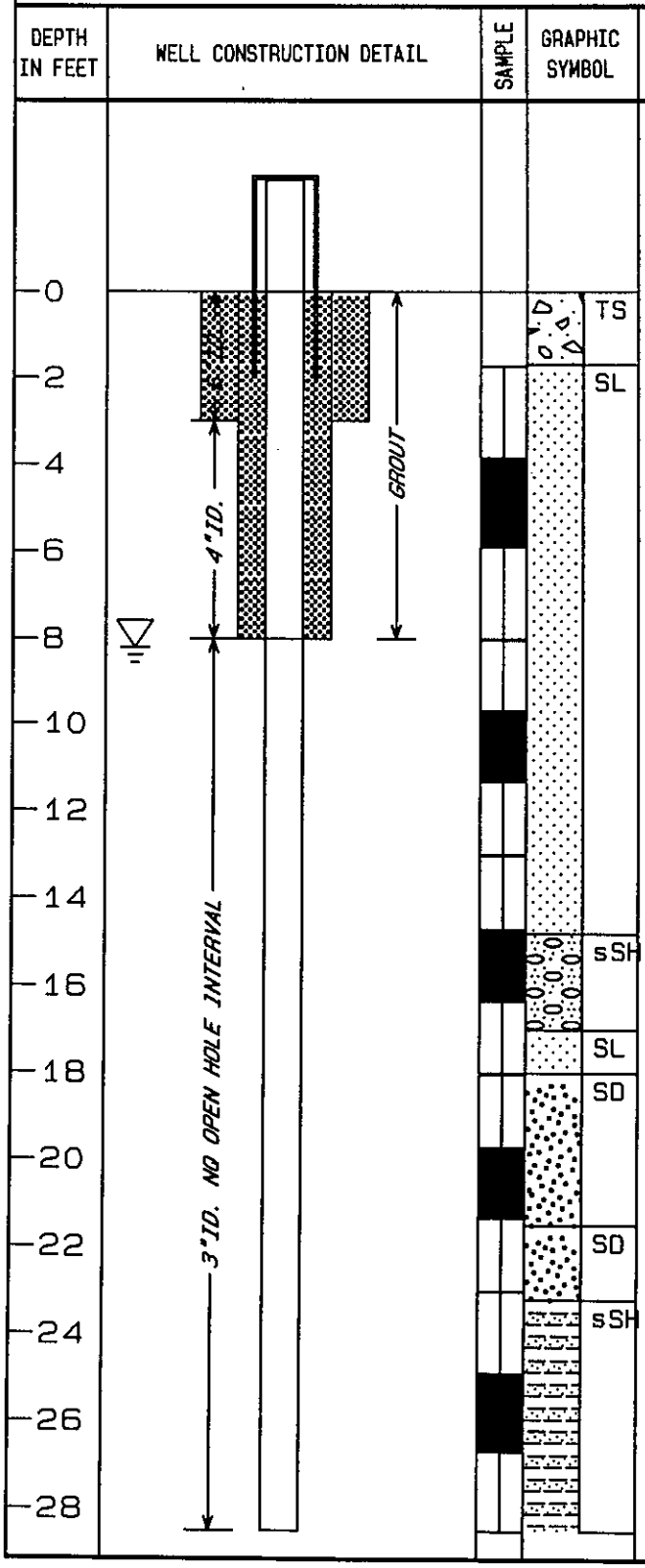
LOCKING CASING: Yes

NOTES:
Hole has different diameter sizes, 6" D from 0-3 ft, 4" D from 3-8 ft., and 3" D from 8-28.7 ft.

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WELL LOG FOR: MW-7

Project Name	Hurley Landfill	Total Depth	28.5 ft
Project No.	628-006	Date Drilled	8 May 91
Location	West of site.	Well Completion Date	9 May 91
Geologist	Tarik Zarrouk	Date Developed	17 May 91
Surface Elevation	642.16 ft	Top of Casing Elevation	644.86 ft



WELL DATA

Client: Morris Associates
Driller: American Auger drilling , Inc.
Type of Well: Bedrock
Static Water Level: 8.2
Date: 9 May 91
Measuring Point: Below grade
Total Well Depth: 28.5 ft
Developing Method: centrifugal pump/ bailer.

DRILLING METHOD:
Type: 6 IN- HQ, NQ Coring — Outer diameter: 6-4-3 in
Casing: PVC (0-8)

SAMPLING METHOD:
Type: cores — Diameter: 3.75, 2.98 in
Weight: Fall: — Interval: 5 ft

RISER PIPE LEFT IN PLACE:
Material: PVC schedule 40 — Diameter: 3 in.
Length: 10.63 ft. (includes stick-up)
Joint Type:

SCREEN:
Material: — Diameter:
Slot Size: — Length:
Stratigraphic Unit:

FILTER PACK:
Sand Grade: Amount: Interval:

SEALS (S):
Type: — Interval:
Type: — Interval:
Type: Concrete — Interval: 8-surface

LOCKING CASING: Yes

NOTES:
Hole has deferrent diameter size , 6" D from 0-3 ft, 4" D from 3-8 ft., and 3" D from 8-28.5 ft.

Lawler, Matusky & Skelly Engineers

TEST BORING: MW-1

Project Name Hurley Landfill
Project No. 628-006
Client Morris Associates
Location SE corner of site, near gate
Geologist Dick Donofrio

Date 26 Feb 91
Total Depth 48.35 feet
Hole Diameter 3 in.
Ground Surface Elevation 648.34 feet
Depth to Water 16.2 feet

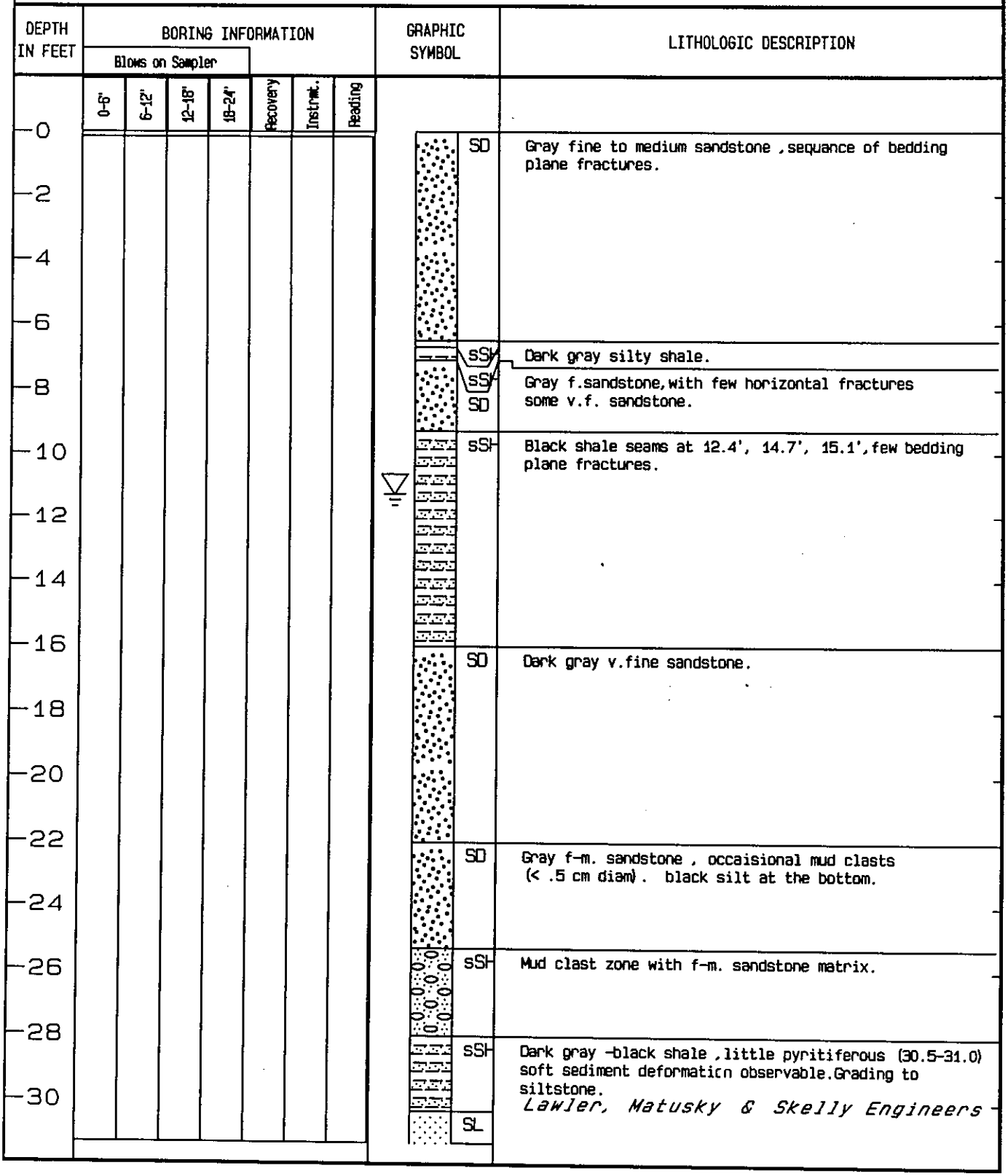
DEPTH IN FEET	BORING INFORMATION: Blows on Sampler 0-6"	6-12"	12-18"	18-24"	Recovery	Instrmt.	Reading	GRAPHIC SYMBOL	LITHOLOGIC DESCRIPTION
0								TS	Dark brown Top soil, some fine sand , little silt trace wood material and clay.
2								SD	Gray fine grained sandstone well cemented, little lamination with bedding plane fractures.
4								SD	The same above, less sorted (sub-angular grains). Mud clasts (1 in.) at 14 ft depth, fractures every 1-2 in. to 16 ft depth and iron oxidestaining in the fractures.
6									
8									
10									
12									
14									
16								SD	
18								SD	Light gray f-m. sandy matrix w/ mud chips.
20								SD	Gray f.-v.f. sandstone , vertical fracture zones at 19.3-20.3 ft, 21.5-22.5 ft.
22									
24								SH	Black silt/shale.
26								SL	Light gray unindurated siltstone.
28								sS	Black silty shale.
30								SD	Gray v. fine sandstone massive- with mud clasts.
32								SD	Gray fine sandstone.
34								SL	Dark gray shaly siltstone , vertical fractures at 28.5-29.5 ft.
36								SSH	Black silt shale ,occasional thin (1-2 in.) fine to v.fine sandstone layers and horizontal fracture every 4-5 ft.
38									
40									
42									
44									
46									
48									

Lawler, Matusky & Skelly Engineers

TEST BORING: MW-3

Project Name Hurley Landfill
Project No. 628-006
Client Morris Associates
Location West of site.
Geologist Tarik Zarrouk

Date 7 May 91
Total Depth 31.3 feet
Hole Diameter 3 in.
Ground Surface Elevation 646.66 feet
Depth to Water 11.25 feet



Lawler, Matusky & Skelly Engineers

TEST BORING: MW-5

Project Name Hurley Landfill
Project No. 628-006
Client Morris Associates
Location East of site, near Fence.
Geologist Tarik Zarrouk

Date 7 May 91
Total Depth 39.5 feet
Hole Diameter 3 in.
Ground Surface Elevation 657.45 feet
Depth to Water 20.25 feet

DEPTH IN FEET	BORING INFORMATION: Blows on Sampler 0-6"	6-12"	12-18"	18-24"	Recovery	Instrmt.	Reading	GRAPHIC SYMBOL	LITHOLOGIC DESCRIPTION
0								SD	Dark gray fine silty sandstone. (0-3 ft, 6" hole size)
2									
4									
6								sSh SD	Dark gray mud clasts and chips in silty sandstone matrix, (3-7.5 ft HQ, 4" hole size). with horizontal bedding plane fractures (1: 2 in. range).
8								fSD	Gray very fine sandstone. fractures every 1: 2 in. to 13 ft depth and iron oxide staining. NQ (3" O.D) Coring hole size started at 7.5 ft.
10								sSH	Dark gray to black silty shale.
12								SL	Dark gray siltstone, with horizontal fractures every 10 in. (average).
14									
16								sSH	Dark gray interbedded siltstone and shale. (more horizontal fractures).
18								sSD	Gray very fine silty sandstone
20									light tan poorly indurated silt.
22								sLSH	Dark gray silt / shale.
24								SD	Dark gray fine sandstone, becoming finer with depth some bedding plane fractures.
26									
28									
30								SD	Dark gray very fine sandstone with some silt to fine sandstone.
32									
34								sSH	Mud clasts and chips in a fine sandy matrix.
36									
38								SD	Gray medium sandstone grading to fine sandstone.

Lawler, Matusky & Skelly Engineers

TEST BORING: MW-6A

Project Name Hurley Landfill
Project No. 628-006
Client Morris Associates
Location NW of site.
Geologist Tarik Zarrouk

Date 9 May 91
Total Depth 28.7 feet
Hole Diameter 3 in.
Ground Surface Elevation 640.36 feet
Depth to Water 9.3 feet

DEPTH IN FEET	BORING INFORMATION: Blows on Sampler 0-6"	6-12"	12-18"	18-24"	Recovery	Instrmt.	Reading	GRAPHIC SYMBOL	LITHOLOGIC DESCRIPTION
0								TS	Dark Brown silty fine sand, some gravel , cobbles boulders.little roots.
2								SL	Dark gray sandy siltstone, some horizontal fractures every 1"-2" (avg).
4								SD	Gray fine to medium sandstone , (fining upwards). very fine grains of pyrite. (more bedding plane fractures)
6									
8									
10									
12									
14									
16								SSH	Gray to dark gray fine sandstone, little pyrite with mud clasts (average < 1 cm diam).
18									
20									
22								SD	Light gray fine sandstone, with few horizontal fractures well laminated, iron oxide, little pyrite flecks.
24									
26								SSH	Gray f-m sandstone with occaisional thin gray siltstone (1" per 1 ft).
28									

Lawler, Matusky & Skelly Engineers

TEST BORING: MW-7

Project Name Hurley Landfill
Project No. 628-006
Client Morris Associates
Location West of site.
Geologist Tarik Zarrouk

Date 8 May 91
Total Depth 28.5 feet
Hole Diameter 3 in.
Ground Surface Elevation 642.16 feet
Depth to Water 8.2 feet

DEPTH IN FEET	BORING INFORMATION: Blows on Sampler 0-6"	6-12"	12-18"	18-24"	Recovery	Instrmt.	Reading	GRAPHIC SYMBOL	LITHOLOGIC DESCRIPTION
0								TS	Dark Brown silty fine sand, some gravel , cobbles boulders.little roots.
2								SL	Dark gray sandy siltstone, some mud clasts at 14 ft some horizontal fractures and many plant fossils.
4									
6									
8									
10									
12									
14									
16								sSH	Gray fine to medium sandstone , some mud clasts.
18								SL	Dark gray sandy siltstone , some sandstone.
20								SD	Light gray fine sandstone, with iron oxide specks.
22								SD	Light gray sandstone, with few horizontal fractures some silt.
24								sSH	Dark gray to black interbedded siltstone and shale. occaisional fine sand seams.
26									
28									

Lawler, Matusky & Skelly Engineers

MEMORANDUM

TO: HURLEY LANDFILL CONSTRUCTION CERTIFICATION REPORT
FROM: GINA M. CALDERONE
RE: TOWN OF HURLEY MONITORING WELL REPLACEMENT
C&A #H0169.0

DATE: OCTOBER 10, 1996

On August 20, Boyd Artesian Well Co., Inc. Of Carmel, NY was contracted to replace MW #4 at the Hurley Landfill. The well was installed approximately 65 feet southwest from the original MW-4. The well was installed down to 25 feet into the bedrock. The top 2 feet of rubble and the top 10 feet of clay was removed using a backhoe from the top of the bedrock to install the well. A boring log and well completion log are attached.

In addition, MW-2 was properly abandoned and removed from the site since it no longer will be monitored. The well bore hole was backfilled with a bentonite slurry.

H:\WORK\H0239.00\HUR1.MEM

SUBSURFACE EXPLORATION – TEST BORING LOG

PROJECT NAME 8/20/96
CLIENT Town of Hurley
DRILLER Boyd Artesian
MONITORING INSTRUMENT(S) Auger Drill

SAMPLE HAMMER
WEIGHT _____ lb.
FALL _____ in.

DATE START 8/20 FINISH 8/20
BORING LOCATION MW-4 replace
TOTAL DEPTH 25 ft
DEPTH OF WATER 3.8' From grade
HOLE DIAMETER 2" PVC well
GROUND SURFACE ELEV. _____

SHEET NO. 1 OF 1

DEPTH	BLOWS ON SAMPLER: 0° TO 6°	6° TO 12°	12° TO 18°	18° TO 24°	RETAINED SAMPLE	RECOVERY (FEET)	SAMPLE NO.	INSTRUMENT READING	MOISTURE CONTENT	STRATIGRAPHIC COLUMN	CLASSIFICATION OF MATERIAL
0-2'											Over Burden Rubble stone dug out w/ Backhoe
2-10'									3.8 ft		clay - moist/wet augered through
10'											Rock surface at 10 ft. Cored to 25 feet. Shale
25'											

F–FINE AND–35–50%
M–MEDIUM SOME–20–35%
C–COARSE LITTLE–10–20%
TRACE–0–10%

MONITORING WELL COMPLETION LOG **WELL NO.** MW-4 Replacement

Project Horley Landfill
Client DO Hurley
Location DOGHILL RD
Project No. H0232.00 / H0169
Date Drilled 8/20/96
Date Developed 8/20/96

Inspector Gina Calderone
Drilling Contractor Boyd Artesian

Type of Well Rock Monitoring
Static Water Level 5.1' Date
Measuring Point (M.P.) grade
Total Depth of Well 25'
Total Depth of Boring 25'

Drilling Methods
Type Auger Diameter 6" O.D
Casing Steel

Sampling Method
Type — Diameter
Weight Fall
Interval

Riser Pipe Left in Place
Material Steel Diameter 6"
Length 3.0' stick up Joint Type

Screen
Material PVC Diameter 6"
Slot Size .01 Length 10 foot
Stratigraphic Unit Screened Rock

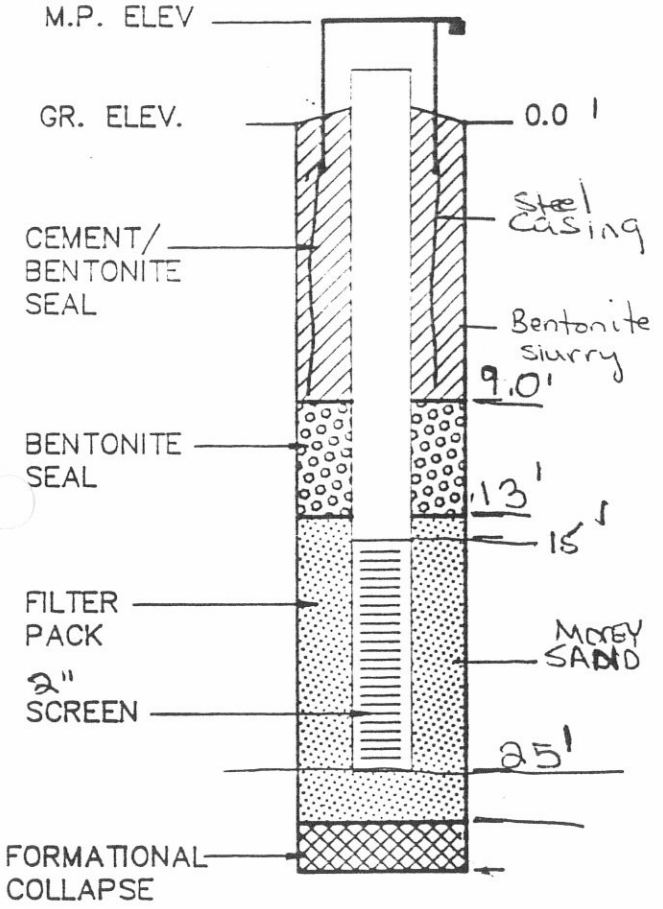
Filter Pack
Sand X Gravel Natural
Grade morey #1 Sand
Amount Interval

Seal(s)
Type grout Interval casing length
Type Interval
Type Interval

Locking Casing [ ] Yes [ ] No

Notes:

WELL CONSTRUCTION DETAIL



NOT TO SCALE

10' screen at Bottom

3 3/4 id auger
6" od auger

APPENDIX B:
Environmental Database Records Search

Government Records Report | 2022

Order Number: 70993

Report Generated: 04/25/2022

Project Name: 5447.0

Project Number:

5447.0
1035 Dug Hill Rd
West Hurley, NY 12491

2 Corporate Drive
Suite 450
Shelton, CT 06484
Toll Free: 866-211-2028
www.envirositecorp.com

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2022

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Envirosite Corporation has conducted a search of all reasonably ascertainable records in accordance with EPA's AAI (40 CFR Part 312) requirements and the ASTM E-1527-21 Environmental Site Assessments standard.

SUBJECT PROPERTY INFORMATION:

ADDRESS:

5447.0
1035 Dug Hill Rd
West Hurley, NY 12491

COORDINATES:

Latitude (North):	41.965644 - 41°57'56.3"
Longitude (West):	-74.109367 - -74°6'33.7"
Universal Transverse Mercator:	Zone 18N
UTM X (Meters):	573800.13
UTM Y (Meters):	4646345.27

ELEVATION:

Elevation:	653 ft. above sea level

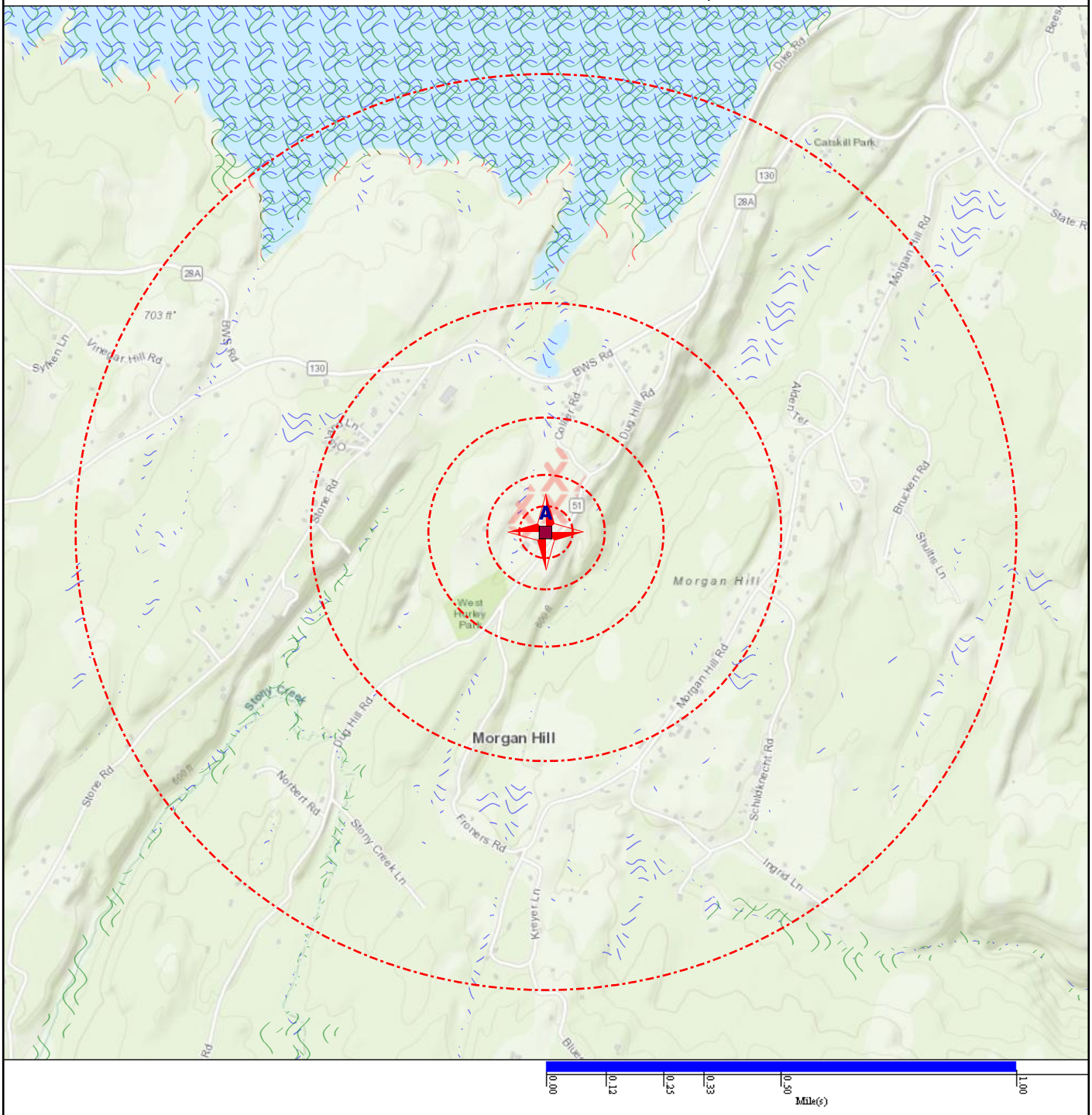
USGS TOPOGRAPHIC MAP ASSOCIATED WITH SUBJECT PROPERTY:

Subject Property Map: 41074-H1 Kingston West, NY
Most Recent Revision: 2019

MAP ID	SITE NAME	ADDRESS	DATABASE(S)	RELATIVE ELEVATION	DIRECTION / DISTANCE
A1	TOWN OF HURLEY H'WAY | HURLEY S...	DOUG HILL RD	EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY		SP
A2	SPILL NUMBER 9908569	1035 DOUGHILL RD	SPILLS - NY		SP
A3	HURLEY | MACKINNON PROPERTY | SH...	DUG HILL RD | DUG HILL RD...	AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, ...		SP
A4	TOWN LANDFILL	43.4875, -74.018333	MINES		SP
A5	Town of Hurley	N R	SPDES - NY		SP
A6	Hurley Town Landfill | HURLEY LANDFI...	1043 DUG HILL ROAD	AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - N...		SP
A7	Hurley Transfer Station	1043 Dud Hill Rd	DEBRIS EPA SWRCY		SP
A8	TOWN OF HURLEY HIGHWAY DEPT.	1035 DUG HILL ROAD	AST PBS - NY, EPA UST, UST PBS - NY		SP

SUBJECT NAME: 5447.0
ADDRESS: 1035 Dug Hill Rd, West Hurley, NY, 12491
LAT/LONG: 41.965644 / -74.109367

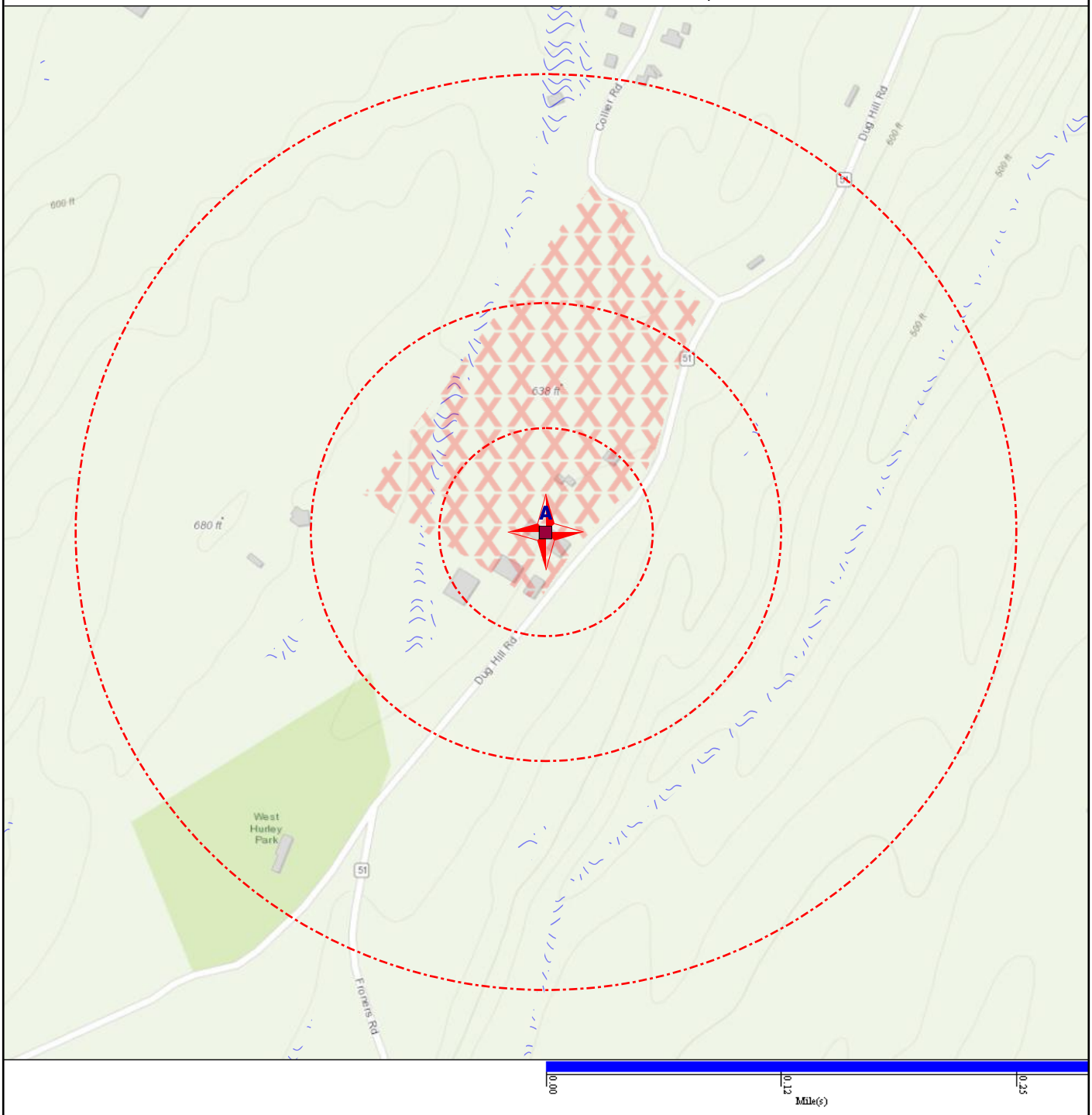
PREPARED FOR: Crawford & Associates Engineering & La...
ORDER #: 70993
REPORT DATE: April 25, 2022



- Subject Property
- CDC HAZDAT (No Data)
- Federal Lands (No Data)
- Indian Reservation (No Data)
- Equal/Higher Elevation
- Department of Defense (No Data)
- FEMA FloodZone 100
- National Priority List (No Data)
- Lower Elevation
- DFIRM Floodzone 100
- FEMA FloodZone 500 (No Data)
- NWI
- Area Of Concern
- DFIRM Floodzone 500
- Historical DOD (No Data)

SUBJECT NAME: 5447.0
ADDRESS: 1035 Dug Hill Rd, West Hurley, NY, 12491
LAT/LONG: 41.965644 / -74.109367

PREPARED FOR: Crawford & Associates Engineering & La...
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- NWI
- Area Of Concern
- DFIRM Floodzone 500
- Historical DOD (No Data)

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
FEDERAL RCRA NON-CORRACTS TSD FACILITIES LIST								
ARCHIVED RCRA TSDF		0.500	0	0	0	--	--	0
RCRA_TSDF		0.500	0	0	0	--	--	0
FEDERAL, STATE, AND TRIBAL REGISTERED STORAGE TANK LISTS								
AST PBS		0.250	0	0	--	--	--	0
EPA UST	X	0.250	0	0	--	--	--	1
FEMA UST		0.250	0	0	--	--	--	0
HIST INDIAN UST R6		0.250	0	0	--	--	--	0
HIST INDIAN UST R7		0.250	0	0	--	--	--	0
INDIAN UST R1		0.250	0	0	--	--	--	0
INDIAN UST R10		0.250	0	0	--	--	--	0
INDIAN UST R2		0.250	0	0	--	--	--	0
INDIAN UST R4		0.250	0	0	--	--	--	0
INDIAN UST R5		0.250	0	0	--	--	--	0
INDIAN UST R6		0.250	0	0	--	--	--	0
INDIAN UST R7		0.250	0	0	--	--	--	0
INDIAN UST R8		0.250	0	0	--	--	--	0
INDIAN UST R9		0.250	0	0	--	--	--	0
AST CBS - NY		0.250	0	0	--	--	--	0
AST PBS - NY	X	0.250	0	0	--	--	--	2
HIST TANKS SUFFOLK COUNTY - NY		0.250	0	0	--	--	--	0
TANKS CORTLAND COUNTY - NY		0.250	0	0	--	--	--	0
TANKS MOSF - NY		0.250	0	0	--	--	--	0
TANKS NASSAU COUNTY - NY		0.250	0	0	--	--	--	0
TANKS ROCKLAND COUNTY - NY		0.250	0	0	--	--	--	0
TANKS SUFFOLK COUNTY - NY		0.250	0	0	--	--	--	0
TANKS WESTCHESTER COUNTY - NY		0.250	0	0	--	--	--	0
UST CBS - NY		0.250	0	0	--	--	--	0
UST PBS - NY	X	0.250	0	0	--	--	--	1
FEDERAL CERCLIS LIST								
CERCLIS NFRAP		0.500	0	0	0	--	--	0
CERCLIS-HIST		0.500	0	0	0	--	--	0
EPA SAA		0.500	0	0	0	--	--	0
FEDERAL FACILITY		1.000	0	0	0	0	--	0
SEMS_8R_ACTIVE SITES		0.500	0	0	0	--	--	0

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
FEDERAL CERCLIS LIST *(cont.)*								
SEMS_8R_ARCHIVED SITES		0.500	0	0	0	--	--	0
FEDERAL RCRA CORRACTS FACILITIES LIST								
CORRACTS		1.000	0	0	0	0	--	0
HIST CORRACTS 2		1.000	0	0	0	0	--	0
FEDERAL DELISTED NPL SITE LIST								
DELISTED NPL		1.000	0	0	0	0	--	0
DELISTED PROPOSED NPL		1.000	0	0	0	0	--	0
SEMS_DELETED NPL		1.000	0	0	0	0	--	0
FEDERAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS								
EPA LF MOP		0.500	0	0	0	--	--	0
FEDERAL, STATE, AND TRIBAL LEAKING STORAGE TANK LISTS								
EPA LUST	X	0.500	0	0	0	--	--	2
HIST INDIAN LUST R4		0.500	0	0	0	--	--	0
HIST INDIAN LUST R8		0.500	0	0	0	--	--	0
INDIAN LUST R1		0.500	0	0	0	--	--	0
INDIAN LUST R10		0.500	0	0	0	--	--	0
INDIAN LUST R2		0.500	0	0	0	--	--	0
INDIAN LUST R4		0.500	0	0	0	--	--	0
INDIAN LUST R5		0.500	0	0	0	--	--	0
INDIAN LUST R6		0.500	0	0	0	--	--	0
INDIAN LUST R7		0.500	0	0	0	--	--	0
INDIAN LUST R8		0.500	0	0	0	--	--	0
INDIAN LUST R9		0.500	0	0	0	--	--	0
LTANKS - NY		0.500	0	0	0	--	--	0
LTANKS 2 - NY	X	0.500	0	0	0	--	--	2
FEDERAL ERNS LIST								
ERNS		SP	0	--	--	--	--	0
FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES								
FED E C		0.500	0	0	0	--	--	0
FED I C		0.500	0	0	0	--	--	0
RCRA IC_EC		0.250	0	0	--	--	--	0
FEDERAL RCRA GENERATORS LIST								
HIST RCRA_CESQG		0.250	0	0	--	--	--	0

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
FEDERAL RCRA GENERATORS LIST *(cont.)*								
HIST RCRA_LQG		0.250	0	0	--	--	--	0
HIST RCRA_NONGEN		0.250	0	0	--	--	--	0
HIST RCRA_SQG		0.250	0	0	--	--	--	0
RCRA_LQG		0.250	0	0	--	--	--	0
RCRA_NONGEN		0.250	0	0	--	--	--	0
RCRA_SQG		0.250	0	0	--	--	--	0
RCRA_VSQG		0.250	0	0	--	--	--	0
FEDERAL NPL SITE LIST								
NPL		1.000	0	0	0	0	--	0
NPL EPA R1 GIS		1.000	0	0	0	0	--	0
NPL EPA R3 GIS		1.000	0	0	0	0	--	0
NPL EPA R6 GIS		1.000	0	0	0	0	--	0
NPL EPA R8 GIS		1.000	0	0	0	0	--	0
NPL EPA R9 GIS		1.000	0	0	0	0	--	0
PART NPL		1.000	0	0	0	0	--	0
PROPOSED NPL		1.000	0	0	0	0	--	0
SEMS_FINAL NPL		1.000	0	0	0	0	--	0
SEMS_PROPOSED NPL		1.000	0	0	0	0	--	0
STATE AND TRIBAL BROWNFIELD SITES								
TRIBAL BROWNFIELDS		0.500	0	0	0	--	--	0
BROWNFIELDS - NY		0.500	0	0	0	--	--	0
HIST BROWNFIELDS - NY		0.500	0	0	0	--	--	0
STATE- AND TRIBAL - EQUIVALENT CERCLIS								
DEL SHWS - NY		1.000	0	0	0	0	--	0
HSWDS - NY	X	0.500	0	0	0	--	--	1
SHWS - NY	X	1.000	0	0	0	0	--	1
STATE RCRA GENERATORS LIST								
HWG - NY		0.250	0	0	--	--	--	0
STATE INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES								
IC EC - NY		0.500	0	0	0	--	--	0
STATE AND TRIBAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS								
SWF/LF - NY	X	0.500	0	0	0	--	--	1

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
STATE AND TRIBAL VOLUNTARY CLEANUP SITES								
VCP - NY		0.500	0	0	0	--	--	0
LOCAL BROWNFIELD LISTS								
BROWNFIELDS-ACRES		0.500	0	0	0	--	--	0
FED BROWNFIELDS		0.500	0	0	0	--	--	0
LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES								
FED CDL		SP	0	--	--	--	--	0
US HIST CDL		SP	0	--	--	--	--	0
LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES								
HIST INDIAN ODI R8		0.500	0	0	0	--	--	0
INDIAN ODI R8		0.500	0	0	0	--	--	0
ODI		0.500	0	0	0	--	--	0
TRIBAL ODI		0.500	0	0	0	--	--	0
HIST SWTIRE - NY		0.500	0	0	0	--	--	0
SWRCY - NY		0.500	0	0	0	--	--	0
SWTIRE - NY		0.500	0	0	0	--	--	0
RECORDS OF EMERGENCY RELEASE REPORTS								
HMIRS (DOT)		SP	0	--	--	--	--	0
HIST SPILLS - NY		0.125	0	--	--	--	--	0
SPILLS - NY	X	0.125	0	--	--	--	--	4
LOCAL LAND RECORDS								
LIENS 2		SP	0	--	--	--	--	0
OTHER ASCERTAINABLE RECORDS								
AFS		SP	0	--	--	--	--	0
ALT FUELING		0.250	0	0	--	--	--	0
BRS		SP	0	--	--	--	--	0
CDC HAZDAT		1.000	0	0	0	0	--	0
COAL ASH DOE		0.500	0	0	0	--	--	0
COAL ASH EPA		0.500	0	0	0	--	--	0
COAL GAS		1.000	0	0	0	0	--	0
COLLEGES		SP	0	--	--	--	--	0
COLLEGES 2		SP	0	--	--	--	--	0
CONSENT (DECREES)		1.000	0	0	0	0	--	0
CORRECTIVE ACTIONS_2020		0.500	0	0	0	--	--	0

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
OTHER ASCERTAINABLE RECORDS *(cont.)*								
DEBRIS EPA LF		0.500	0	0	0	--	--	0
DEBRIS EPA SWRCY	X	0.500	0	0	0	--	--	1
DOD		1.000	0	0	0	0	--	0
DOT OPS		SP	0	--	--	--	--	0
ECHO		SP	0	--	--	--	--	0
ENOI		SP	0	--	--	--	--	0
EPA FUELS		SP	0	--	--	--	--	0
EPA OSC		0.125	0	--	--	--	--	0
EPA WATCH		SP	0	--	--	--	--	0
FA HWF		SP	0	--	--	--	--	0
FEDLAND		1.000	0	0	0	0	--	0
FRS	X	SP	--	--	--	--	--	2
FTTS		SP	0	--	--	--	--	0
FTTS INSP		SP	0	--	--	--	--	0
FUDS		1.000	0	0	0	0	--	0
HIST AFS		SP	0	--	--	--	--	0
HIST AFS 2		SP	0	--	--	--	--	0
HIST DOD		1.000	0	0	0	0	--	0
HIST LEAD_SMELTER		SP	0	--	--	--	--	0
HIST MLTS		SP	0	--	--	--	--	0
HIST PCB TRANS		SP	0	--	--	--	--	0
HIST PCS ENF		SP	0	--	--	--	--	0
HIST PCS FACILITY		SP	0	--	--	--	--	0
HIST SSTS		SP	0	--	--	--	--	0
HOSPITALS		SP	0	--	--	--	--	0
HWC DOCKET		SP	0	--	--	--	--	0
ICIS		SP	0	--	--	--	--	0
INACTIVE PCS		SP	0	--	--	--	--	0
INDIAN RESERVATION		1.000	0	0	0	0	--	0
LUCIS		0.500	0	0	0	--	--	0
LUCIS 2		0.500	0	0	0	--	--	0
MANIFEST EPA		0.250	0	0	--	--	--	0
MINE OPERATIONS		0.250	0	0	--	--	--	0
MINES	X	0.250	0	0	--	--	--	1
MINES USGS		0.250	0	0	--	--	--	0
MLTS		SP	0	--	--	--	--	0

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
OTHER ASCERTAINABLE RECORDS *(cont.)*								
NPL AOC		1.000	0	0	0	0	--	0
NPL LIENS		SP	0	--	--	--	--	0
NURSING HOMES		SP	0	--	--	--	--	0
OSHA		SP	0	--	--	--	--	0
PADS		SP	0	--	--	--	--	0
PCB TRANSFORMER		SP	0	--	--	--	--	0
PCS ENF		SP	0	--	--	--	--	0
PCS FACILITY		SP	0	--	--	--	--	0
PFAS NPL		0.500	0	0	0	--	--	0
PFAS TRIS		0.500	0	0	0	--	--	0
PFAS UCMR3		0.500	0	0	0	--	--	0
RAATS		SP	0	--	--	--	--	0
RADINFO		SP	0	--	--	--	--	0
RMP		0.500	0	0	0	--	--	0
ROD		1.000	0	0	0	0	--	0
SCHOOLS PRIVATE		SP	0	--	--	--	--	0
SCHOOLS PUBLIC		SP	0	--	--	--	--	0
SCRD DRYCLEANERS		0.250	0	0	--	--	--	0
SEMS_SMELTER		SP	0	--	--	--	--	0
SSTS		SP	0	--	--	--	--	0
STORMWATER		SP	0	--	--	--	--	0
TOSCA-PLANT		SP	0	--	--	--	--	0
TRIS		SP	0	--	--	--	--	0
UMTRA		0.500	0	0	0	--	--	0
VAPOR		0.500	0	0	0	--	--	0
AIRS - NY		SP	0	--	--	--	--	0
AOC - NY	X	1.000	0	0	0	0	--	1
COAL ASH - NY		0.500	0	0	0	--	--	0
DAYCARE - NY		SP	0	--	--	--	--	0
DAYCARE NYC - NY		SP	0	--	--	--	--	0
DRYCLEANERS - NY		0.250	0	0	--	--	--	0
E DESIGNATION - NY		0.125	0	--	--	--	--	0
ERP - NY		0.500	0	0	0	--	--	0
FA 1 - NY		SP	0	--	--	--	--	0
FA 2 - NY		SP	0	--	--	--	--	0
HIST DRYCLEANERS - NY		0.250	0	0	--	--	--	0

DATABASE	SUBJECT PROPERTY	SEARCH DISTANCE (MILES)	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	>1	TOTAL MAPPED
OTHER ASCERTAINABLE RECORDS *(cont.)*								
HIST MANIFEST - NY		0.250	0	0	--	--	--	0
MANIFEST - NY		0.250	0	0	--	--	--	0
PFAS - NY		0.500	0	0	0	--	--	0
PFAS AFFF - NY		0.500	0	0	0	--	--	0
PFAS AFFF 2 - NY		0.500	0	0	0	--	--	0
RES DECL - NY		0.500	0	0	0	--	--	0
SPDES - NY	X	SP	--	--	--	--	--	1
UIC - NY		SP	0	--	--	--	--	0
VAPOR REOPENED - NY		SP	0	--	--	--	--	0
STATE RECORDS								
HIST SPDES - NY		SP	0	--	--	--	--	0

Map Id: A1
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY H'WAY | HURLEY SANITARY LANDFILL
DOUG HILL RD
WEST HURLEY | HURLEY, NY 12443

Database(s) : [EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY]

Envirosite ID: 4786072
EPA ID: N/R

EPA LUST

Facility Name :	TOWN OF HURLEY H'WAY
Facility Address :	DOUG HILL RD, WEST HURLEY, New York
County :	Ulster
Facility ID :	NY197055
LUST ID :	NY9806705
Reported Date :	1998-08-31
Status :	No Further Action
Substance :	N/R
Closed With Residual Contamination (Tribal Only):	N/R
NFA_Letter (Tribal Only) :	N/R
Tribe (Tribal Only) :	N/R
EPA Region :	2
Estimated Population within 1500ft :	N/R
Estimated Private Domestic Wells within 1500ft:	N/R
Within Source Water Protection Area (SPA):	N/R
SPA Public Water System and Facility ID:	N/R
SPA Water Type :	N/R
SPA Facility Type :	N/R
SPA HUC12 :	N/R
Within Groundwater Wellhead Protection Area (WHPA):	N/R
WHPA Public Water System and Facility ID:	N/R
WHPA Water Type :	N/R
WHPA Facility Type :	N/R
WHPA HUC12 :	N/R
Within Estimated 100-year Floodplain:	N/R
Latitude :	41.968020000000003
Longitude :	-74.106600000000000
Last Date in Agency List :	2022-01-04

FRS

Facility Name :	HURLEY SANITARY LANDFILL
Facility Address :	DOUG HILL RD., HURLEY, NY 12443
County :	ULSTER

Site Details

Registry ID :	110013977526
FRS Facility URL :	Click here for hyperlink provided by the agency.
Last Date in Agency List :	2022-02-17

Source Description

Map Id: A1
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY H'WAY | HURLEY SANITARY LANDFILL
DOUG HILL RD
WEST HURLEY | HURLEY, NY 12443

Database(s) : [EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4786072
EPA ID: N/R

FRS ***(cont.)***

Source Description :

The Emission Inventory System (EIS) maintains an inventory of large stationary sources and voluntarily-reported smaller sources of air point pollution emitters. It contains information about facility sites and their physical location, emission units, emission processes, release points, control approaches, and regulations. Facility inventory data are kept separate from the emissions data and have stable identifiers to improve continuity from year to year and to help identify duplicate or missing facilities.

FRS Environmental Interest

Source and System ID :	EIS - 8324211

LTANKS 2 - NY

Facility Name :	TOWN OF HURLEY H'WAY
Facility Address :	DOUG HILL RD, WEST HURLEY
County :	Ulster

Spill Details

Site ID :	239585
Spill Number :	9806705
Program Type :	ER
DER Facility ID :	197055
DEC Region :	3
Spill Date :	1998-08-31 14:00:00
Close Date :	1999-05-14 00:00:00
Contributing Factor :	Tank Failure
Material Spilled Classification :	C3
SWIS Code :	5600
DEC Lead on Spill :	RICCI
Referred to :	N/R
Received Date :	1998-08-31 17:06:00
Computer ID :	233
Waterbody :	N/R
Source :	Institutional, Educational, Gov., Other
Reported by :	Other
Cleanup Activity Ceased Date :	N/R
Cleanup Meets Standard :	False
Inspection Date :	N/R
Penalty :	False
UST Trust :	True
Remed Phase :	0
Date Record Created :	1998-08-31 00:00:00
Record Last Updated :	2000-06-16 00:00:00
Spiller Name :	LINDA COOK
Spiller Company :	TOWN OF HURLEY H'WAY
Spiller Address :	DOUG HILL RD, W. HURLEY, ZZ
Spiller Country :	001
Contact Name :	N/R
Contact Phone :	N/R
Contact Extension :	N/R
After Hours :	True

Map Id: A1
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY H'WAY | HURLEY SANITARY LANDFILL
DOUG HILL RD
WEST HURLEY | HURLEY, NY 12443

Database(s) : [EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4786072
EPA ID: N/R

LTANKS 2 - NY ***(cont.)***

Latitude :	N/R
Longitude :	N/R
Caller Remark :	tank being removed conatiminated soil encountered soil being stock piled on site dec rep larry ricki was on site today tank is a 1000 gal
DEC Remark :	N/R
Last Date in Agency List :	2022-03-22

Material Details

Spill Number :	9806705
Operable Unit ID :	1067903
Operable Unit :	01
Material ID :	317852
Material Code :	0008
Material Name :	diesel
Case Number :	N/R
Material Family :	Petroleum
Quantity :	.00
Units :	G
Recovered :	.00
Affected Media: Soil :	True
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	False
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	False
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

SPILLS - NY

Facility Name :	TOWN OF HURLEY H'WAY
Facility Address :	DOUG HILL RD, WEST HURLEY
County :	Ulster

Spill Details

Site ID :	239585
Spill Number :	9806705
Program Type :	ER
DER Facility ID :	197055
DEC Region :	3
Spill Date :	1998-08-31 14:00:00
Close Date :	1999-05-14 00:00:00
Contributing Factor :	Tank Failure
Material Spilled Classification :	C3
SWIS Code :	5600
DEC Lead on Spill :	RICCI

Map Id: A1
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY H'WAY | HURLEY SANITARY LANDFILL
DOUG HILL RD
WEST HURLEY | HURLEY, NY 12443

Database(s) : [EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4786072
EPA ID: N/R

SPILLS - NY ***(cont.)***

Referred to :	N/R
Received Date :	1998-08-31 17:06:00
Computer ID :	233
Waterbody :	N/R
Source :	Institutional, Educational, Gov., Other
Reported by :	Other
Cleanup Activity Ceased Date :	N/R
Cleanup Meets Standard :	False
Inspection Date :	N/R
Penalty :	False
UST Trust :	True
Remed Phase :	0
Date Record Created :	1998-08-31 00:00:00
Record Last Updated :	2000-06-16 00:00:00
Spiller Name :	LINDA COOK
Spiller Company :	TOWN OF HURLEY H'WAY
Spiller Address :	DOUG HILL RD, W. HURLEY, ZZ
Spiller Country :	001
Contact Name :	N/R
Contact Phone :	N/R
Contact Extension :	N/R
After Hours :	True
Latitude :	N/R
Longitude :	N/R
Caller Remark :	tank being removed conatiminated soil encountered soil being stock piled on site dec rep larry ricki was on site today tank is a 1000 gal
DEC Remark :	N/R
Last Date in Agency List :	2022-02-03

Material Details

Spill Number :	9806705
Operable Unit ID :	1067903
Operable Unit :	01
Material ID :	317852
Material Code :	0008
Material Name :	diesel
Case Number :	N/R
Material Family :	Petroleum
Quantity :	.00
Units :	G
Recovered :	.00
Affected Media: Soil :	True
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	False
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	False
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False

Map Id: A1
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY H'WAY | HURLEY SANITARY LANDFILL
DOUG HILL RD
WEST HURLEY | HURLEY, NY 12443

Database(s) : [EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4786072
EPA ID: N/R

SPILLS - NY ***(cont.)***

Oxygenate : N/R

Map Id: A2
Direction:
Distance:
Elevation:
Relative:

Site Name : SPILL NUMBER 9908569
1035 DOUGHILL RD
HURLEY, NY

Database(s) : [SPILLS - NY]

Envirosite ID: 4889995
EPA ID: N/R

SPILLS - NY

Facility Name : SPILL NUMBER 9908569
Facility Address : 1035 DOUGHILL RD, HURLEY
County : Ulster

Spill Details

Site ID :	189194
Spill Number :	9908569
Program Type :	ER
DER Facility ID :	157962
DEC Region :	3
Spill Date :	1999-10-14 15:18:00
Close Date :	1999-12-30 00:00:00
Contributing Factor :	Abandoned Drums
Material Spilled Classification :	C3
SWIS Code :	5628
DEC Lead on Spill :	RICCI
Referred to :	N/R
Received Date :	1999-10-14 15:18:00
Computer ID :	233
Waterbody :	SMALL STREAM
Source :	Unknown
Reported by :	Citizen
Cleanup Activity Ceased Date :	N/R
Cleanup Meets Standard :	True
Inspection Date :	N/R
Penalty :	False
UST Trust :	False
Remed Phase :	0
Date Record Created :	1999-10-14 00:00:00
Record Last Updated :	2000-04-05 00:00:00
Spiller Name :	UNKNOWN
Spiller Company :	Unknown
Spiller Address :	UNKNOWN, UNKNOWN, NY
Spiller Country :	999
Contact Name :	N/R
Contact Phone :	N/R
Contact Extension :	N/R

Map Id: A2
Direction:
Distance:
Elevation:
Relative:

Site Name : SPILL NUMBER 9908569
1035 DOUGHILL RD
HURLEY, NY

Database(s) : [SPILLS - NY] ***(cont.)***

Envirosite ID: 4889995
EPA ID: N/R

SPILLS - NY ***(cont.)***

After Hours :	False
Latitude :	41.968053362
Longitude :	-74.106645547
Caller Remark :	caller has seen two 275 gallon tanks that have been dumped behind the highway garage in the recycling center the tanks are leaking material which is running into a small stream and into a swamp area near by request officer to check today he feels they will bury the tanks on site
DEC Remark :	N/R
Last Date in Agency List :	2022-02-03

Material Details

Spill Number :	9908569
Operable Unit ID :	1087253
Operable Unit :	01
Material ID :	297682
Material Code :	0066A
Material Name :	unknown petroleum
Case Number :	N/R
Material Family :	Petroleum
Quantity :	.00
Units :	G
Recovered :	.00
Affected Media: Soil :	False
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	False
Affected Media: Surface Water :	True
Affected Media: Drinking Water :	False
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY]

Envirosite ID: 4976239
EPA ID: N/R

AST PBS - NY

Facility Name :	TOWN OF HURLEY RECYCLING CENTER
Facility Address :	DUG HILL ROAD 1 MILE FROM RTE 28A, HURLEY, 12443
County :	Ulster

Site Information

Expiration Date :	N/A
Site ID :	34215
Site Type :	Unknown
Site Status :	Unregulated/Closed
Program Number :	3-600953
Program Type :	Petroleum Bulk Storage
DEC Region :	3
Last Date in Agency List :	2022-04-19

Affiliation Details

Affiliation Type :	Emergency Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	J.R. CRAVEN
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	001
Phone :	(914) 338-6140
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Facility Owner
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	N/R
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	N/R
Country Code :	001
Phone :	(845) 338-4067
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Mail Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	J.R. CRAVEN
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	N/R

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

AST PBS - NY ***(cont.)***

Country Code :	001
Phone :	(914) 331-7474
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Facility Operator
Company :	TOWN OF HURLEY RECYCLING CENTER
Contact Title :	N/R
Contact Name :	J.R. CRAVEN
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	001
Phone :	(914) 338-5412
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Tank Information :	Tank Information withheld (not releaseable under Freedom of Information Law) in accordance with Public Officers Law Sections 86.5, 87.2(F), 89.5(a)(1)(1-a)

EPA LUST

Facility Name :	HURLEY
Facility Address :	DUG HILL RD, HURLEY, New York
County :	Ulster

Facility ID :	NY105439
LUST ID :	NY8604544
Reported Date :	1986-10-16
Status :	No Further Action
Substance :	N/R
Closed With Residual Contamination (Tribal Only):	N/R
NFA_Letter (Tribal Only) :	N/R
Tribe (Tribal Only) :	N/R
EPA Region :	2
Estimated Population within 1500ft :	47
Estimated Private Domestic Wells within 1500ft:	20
Within Source Water Protection Area (SPA):	No
SPA Public Water System and Facility ID:	N/R
SPA Water Type :	N/R
SPA Facility Type :	N/R

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

EPA LUST ***(cont.)***

SPA HUC12 :	N/R
Within Groundwater Wellhead Protection Area (WHPA):	Yes
WHPA Public Water System and Facility ID:	NY5530268_70400
WHPA Water Type :	GW
WHPA Facility Type :	WL
WHPA HUC12 :	020200060906
Within Estimated 100-year Floodplain:	No
Latitude :	41.965370000000000
Longitude :	-74.109099999999899
Last Date in Agency List :	2022-01-04

FRS

Facility Name :	ARNOLD PROPERTY
Facility Address :	DUG HILL ROAD, HURLEY, NY 12443
County :	ULSTER

Site Details

Registry ID :	110019744552
FRS Facility URL :	Click here for hyperlink provided by the agency.
Last Date in Agency List :	2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest

Source and System ID :	FIS - 3-5128-00027
Facility Name :	BREH HOLDING PROPERTY
Facility Address :	DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD, HURLEY, NY 12443
County :	ULSTER

Site Details

Registry ID :	110019541762
FRS Facility URL :	Click here for hyperlink provided by the agency.

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

FRS ***(cont.)***

Last Date in Agency List : 2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest

Source and System ID : FIS - 3-5128-00052

Facility Name : MACKINNON PROPERTY
Facility Address : DUG HILL RD, HURLEY, NY 0000
County : ULSTER

Site Details

Registry ID : 110019499639
FRS Facility URL : Click here for hyperlink provided by the agency.
Last Date in Agency List : 2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest

Source and System ID : FIS - 3-5154-00037

Facility Name : MAUER PROPERTY/RESIDENTIAL SCHOOL
Facility Address : DUG HILL ROAD, HURLEY, NY 12443
County : ULSTER

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

FRS ***(cont.)***

Site Details
Registry ID : 110055294220
FRS Facility URL : Click here for hyperlink provided by the agency.
Last Date in Agency List : 2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest
Source and System ID : FIS - 3-5128-00021

Facility Name : SHULTIS LOG FORDING-MACKINNON PROPERTY
Facility Address : DUG HILL RD, HURLEY, NY 12443
County : ULSTER

Site Details
Registry ID : 110019417665
FRS Facility URL : Click here for hyperlink provided by the agency.
Last Date in Agency List : 2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest
Source and System ID : FIS - 3-5128-00012

Facility Name : TOWN OF HURLEY TRANSFER STATION
Facility Address : DUG HILL RD, HURLEY, NY 12443
County : ULSTER

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

FRS ***(cont.)***

Site Details

Registry ID :	110019299891
FRS Facility URL :	Click here for hyperlink provided by the agency.
Last Date in Agency List :	2022-02-17

Source Description

Source Description :

The FIS, managed by the New York Department of Environmental Conservation (DEC), houses all information about facilities that are regulated or of environmental interest to the state of New York.

FRS Environmental Interest

Source and System ID :	FIS - 3-5128-00033

LTANKS 2 - NY

Facility Name :	HURLEY
Facility Address :	DUG HILL RD, HURLEY
County :	Ulster

Spill Details

Site ID :	121466
Spill Number :	8604544
Program Type :	ER
DER Facility ID :	105439
DEC Region :	3
Spill Date :	1986-10-16 10:30:00
Close Date :	1987-01-12 00:00:00
Contributing Factor :	Tank Test Failure
Material Spilled Classification :	N/R
SWIS Code :	5628
DEC Lead on Spill :	jeokesso
Referred to :	N/R
Received Date :	1986-10-16 12:17:00
Computer ID :	N/R
Waterbody :	N/R
Source :	Institutional, Educational, Gov., Other
Reported by :	Tank Tester
Cleanup Activity Ceased Date :	1987-01-12 00:00:00
Cleanup Meets Standard :	True
Inspection Date :	1987-01-12 00:00:00
Penalty :	False
UST Trust :	True
Remed Phase :	0

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

LTANKS 2 - NY ***(cont.)***

Date Record Created :	1986-10-23 00:00:00
Record Last Updated :	1987-01-20 00:00:00
Spiller Name :	N/R
Spiller Company :	T/HURLEY
Spiller Address :	ZZ
Spiller Country :	001
Contact Name :	N/R
Contact Phone :	N/R
Contact Extension :	N/R
After Hours :	False
Latitude :	41.965369994
Longitude :	-74.109097000
Caller Remark :	TTTF
DEC Remark :	Prior to Sept, 2004 data translation this spill Lead_DEC Field was OKESSON / / : RETEST TO BE PERFORMED IN DECEMBER. / / : 10/20/86-2000G TANK TO BE REPLACED BY THE TOWN. / / : 1/12/87-TANK REPLACED-NFA.
Last Date in Agency List :	2022-03-22

Material Details

Spill Number :	8604544
Operable Unit ID :	901648
Operable Unit :	01
Material ID :	477343
Material Code :	0009
Material Name :	gasoline
Case Number :	N/R
Material Family :	Petroleum
Quantity :	.00
Units :	N/R
Recovered :	.00
Affected Media: Soil :	False
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	True
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	False
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

SPILLS - NY

Facility Name :	HURLEY
Facility Address :	DUG HILL RD, HURLEY

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

SPILLS - NY ***(cont.)***

County :	Ulster

Spill Details

Site ID :	121466
Spill Number :	8604544
Program Type :	ER
DER Facility ID :	105439
DEC Region :	3
Spill Date :	1986-10-16 10:30:00
Close Date :	1987-01-12 00:00:00
Contributing Factor :	Tank Test Failure
Material Spilled Classification :	N/R
SWIS Code :	5628
DEC Lead on Spill :	jeokesso
Referred to :	N/R
Received Date :	1986-10-16 12:17:00
Computer ID :	N/R
Waterbody :	N/R
Source :	Institutional, Educational, Gov., Other
Reported by :	Tank Tester
Cleanup Activity Ceased Date :	1987-01-12 00:00:00
Cleanup Meets Standard :	True
Inspection Date :	1987-01-12 00:00:00
Penalty :	False
UST Trust :	True
Remed Phase :	0
Date Record Created :	1986-10-23 00:00:00
Record Last Updated :	1987-01-20 00:00:00
Spiller Name :	N/R
Spiller Company :	T/HURLEY
Spiller Address :	ZZ
Spiller Country :	001
Contact Name :	N/R
Contact Phone :	N/R
Contact Extension :	N/R
After Hours :	False
Latitude :	41.965369994
Longitude :	-74.109097000
Caller Remark :	TTTF
DEC Remark :	Prior to Sept, 2004 data translation this spill Lead_DEC Field was OKESSON / / : RETEST TO BE PERFORMED IN DECEMBER. / / : 10/20/86-2000G TANK TO BE REPLACED BY THE TOWN. / / : 1/12/87-TANK REPLACED-NFA.
Last Date in Agency List :	2022-02-03

Map Id: A3
Direction:
Distance:
Elevation:
Relative:

Site Name : HURLEY | MACKINNON PROPERTY | SHULTIS LOG FORDING-MACKINNON PROPERTY
DUG HILL RD | DUG HILL RD APPROX 2500 FT SO OF INTERSEC W/FRONERS RD | DUG HILL ROAD 1 MILE FROM RTE 28A
HURLEY, NY 12443

Database(s) : [AST PBS - NY, EPA LUST, FRS, LTANKS 2 - NY, SPILLS - NY] ***(cont.)***

Envirosite ID: 4976239
EPA ID: N/R

SPILLS - NY ***(cont.)***

Material Details

Spill Number :	8604544
Operable Unit ID :	901648
Operable Unit :	01
Material ID :	477343
Material Code :	0009
Material Name :	gasoline
Case Number :	N/R
Material Family :	Petroleum
Quantity :	.00
Units :	N/R
Recovered :	.00
Affected Media: Soil :	False
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	True
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	False
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

Map Id: A4
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN LANDFILL
43.4875, -74.018333
NY

Database(s) : [MINES]

Envirosite ID: 7780162
EPA ID: N/R

MINES

Facility Name :	TOWN LANDFILL
Facility Address :	NY

Mines Information

Mine ID :	3003139
Coal/Metal Indicator :	Metal
Current Mine Type :	Surface
Current Mine Status :	Abandoned
Current Mine Status Date :	2021-02-08
Current Controller ID :	M40024
Current Controller Name :	Town of Thurman-NY
Current Operator ID :	L14020

Map Id: A4
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN LANDFILL
43.4875, -74.018333
NY

Database(s) : [MINES] ***(cont.)***

Envirosite ID: 7780162
EPA ID: N/R

MINES ***(cont.)***

Current Operator Name :	Town Of Thurman Highway Dept.
BOM State Code :	30
FIPS County Name :	Warren
Congressional District Code :	N/R
Company Type :	Other
Current Controller Begin Date :	1995-04-01
District :	M2
Office Code :	M2881
Office Name :	Albany NY Field Office
Assess Control Number :	000368710
Primary SIC Code :	144200
Primary SIC :	Construction Sand and Gravel
Primary SIC Code 1 :	1442
Primary SIC Code Suffix :	00
Secondary SIC Code :	N/R
Secondary SIC :	N/R
Secondary SIC Code 1 :	N/R
Secondary SIC Code Suffix :	N/R
Primary Canvass Code :	5
Primary Canvass :	SandAndGravel
Secondary Canvass Code :	N/R
Secondary Canvass :	N/R
Current 103I :	Never Had 103I Status
Current 103I Date :	N/R
Portable Operation :	Y
Portable FIPS State Code :	36
Days Per Week :	0
Hours Per Shift :	0
Production Shifts Per Day :	0
Maintained Shifts Per Day :	0
Number of Employees :	0
Part 48 Training :	Y
Average Mine Height :	N/R
Mine Gas Category Code :	N/R
Methane Liberation :	N/R
Number Producing Pits :	N/R
Number Non Producing Pits :	N/R
No Tailing Ponds :	0
Pillar Recovery Used :	N
Highwall Miner Used :	N
Multiple Pits :	N
Miners Rep Indicator :	N
Safety Committee Indicator :	N
Miles from Office :	70
Directions to Mine :	2.5 miles from Athol
Nearest Town :	Athol
Latitude :	43.4875
Longitude :	-74.018333
Last Date in Agency List :	2022-03-29

Facility Description

Facility Name :	TOWN LANDFILL
Contact Title :	Hwy. Supt.
Nearest Town :	Athol
Business Name :	Town Of Thurman Highway Dept.

Map Id: A4
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN LANDFILL
43.4875, -74.018333
NY

Database(s) : [MINES] ***(cont.)***

Envirosite ID: 7780162
EPA ID: N/R

MINES ***(cont.)***

Business Address :	311 Athol Road, Thurman, NY 12810
FIPS State Code :	36
Country :	USA
Province :	N/R
Postal Code :	N/R

Map Id: A5
Direction:
Distance:
Elevation:
Relative:

Site Name : Town of Hurley
N/R
Hurley, NY 12443

Database(s) : [SPDES - NY]

Envirosite ID: 7970914
EPA ID: N/R

SPDES - NY

Facility Name :	Town of Hurley
Facility Address :	Hurley, NY 12443
County :	Ulster
Permit ID :	NYR20A425
Discharge Class Code :	N/R
Discharge Class Description :	N/R
Primary SIC Description :	N/R
Permittee Organization Name :	N/R
Permittee Address :	N/R
Issue Date :	N/R
Effective Date :	N/R
Expiration Date :	N/R
Termination Date :	N/R
Status :	N/R
MS4 Entity :	N/R
MS4 Name :	GARY S BELLOWS
Contact Title :	TOWN OF HURLEY SUPERVISOR
Contact Address :	10 Wamsley Place
Contact County :	N/R
Region :	3
Latitude :	N/R
Longitude :	N/R
Last Date in Agency List :	2022-03-07

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY]

Envirosite ID: 31083377
EPA ID: N/R

AOC - NY

Facility Name :	Hurley Town Landfill
Facility Address :	1043 Dug Hill Road, Hurley, 12491
County :	Ulster
Site Code :	356062
Program :	State Superfund Program
Locality :	West Hurley
Region :	3
Method :	4.2
Site Class :	Potential: Classification is used for sites where preliminary information indicates that a site may have contamination that makes it eligible for consideration for placement on the Registry of Inactive Hazardous Waste Disposal Sites
UTM X :	573810
UTM Y :	4646442
Detail URL :	Click here for hyperlink provided by the agency.
Last Date in Agency List :	2021-09-01

Facility Name :	Hurley Town Landfill
Facility Address :	1043 DUG HILL ROAD, Hurley, 12491
County :	Ulster
Site Code :	356062
Program :	State Superfund Program
Locality :	WEST HURLEY
Region :	3
Method :	4.2
Site Class :	Potential: Classification is used for sites where preliminary information indicates that a site may have contamination that makes it eligible for consideration for placement on the Registry of Inactive Hazardous Waste Disposal Sites
UTM X :	573810
UTM Y :	4646442
Detail URL :	Click here for hyperlink provided by the agency.
Last Date in Agency List :	2022-02-03

HSWDS - NY

Facility Name :	Hurley Town Landfill
Facility Address :	1043 DUG HILL ROAD, WEST HURLEY, 12491
County :	Ulster

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

HSWDS - NY ***(cont.)***

Site Details

Site Code :	356062
Program :	State Superfund Program
Classification :	Potential
EPA ID :	N/R
DEC Region :	3
Site Type :	N/R
Estimated Size :	13 Acres
Latitude :	41.966514
Longitude :	-74.109235
Last Date in Agency List :	2022-03-28

Site Owner and Operator Details

Site Owner(s) :	Town of Hurley (Current Owner)
Operator(s) :	N/R
Address :	10 Wamsley Place Hurley,NY, 12443 (Current Owner)

Summary of Project Completion Dates

Completion Date :	N/R
Operable Unit :	N/R
Project Name :	N/R

Site Document Repository Details

Name :	N/R
Address :	N/R

Hazardous Waste Disposal Period

From :	N/R
To :	N/R

Institutional And Engineering Controls Details

Control Type :	N/R
Control Elements :	N/R

Site Description :

Location: The Hurley Town Landfill is a 13-acre site located approximately 0.6 miles south of the Ashokan Reservoir in the Town of Hurley in Ulster County, bounded by Collier Road to the north and Dug Hill Road to the east. The site is located primarily in a forested area with residential properties to the north. Southwest of the site is West Hurley Park. Site Features: The approximately 9-acre inactive landfill footprint encompasses about three-quarters of the site. The landfill has a domed profile with steep side slopes. A swampy area is located along the western edge of

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

HSWDS - NY ***(cont.)***

the landfill. The landfill has a leachate collection system which is pumped out periodically by the Town and disposed of at a wastewater treatment plant. The Hurley Highway Department and transfer station complex occupies the southern portion of the site adjacent to the inactive landfill. Access to the site is restricted by a perimeter fence on the east and a cable to restrict entry from the northeast. Current Zoning and Land Use: The site has a property class of Highway Garage according to the Real Property Services tax parcel information. The southern portion of the site is used by the Town of Hurley Highway Department for various maintenance activities including equipment and material storage, vehicle maintenance, and a transfer station. The landfill cap and leachate collection system is maintained by the Town. Past use of the Site: The site historically operated as a municipal solid waste landfill reportedly from the early 1960s to 1996 when it was closed using Landfill Closure State Assistance Program Funds. Besides municipal solid waste, C&D debris, brush, logs, and metal filings from Numrich Arms in West Hurley was reportedly disposed. Closure included an engineered cover system, installation of gas vents, a gas venting trench, and a leachate collection system. Post-closure monitoring was to be conducted for a minimum of five years. Additional information will be provided once it becomes available. Site Geology and Hydrogeology: Local groundwater is expected to flow generally towards the northwest. Additional information will be provided once it becomes available.

Contaminants of Concern : Perfluorooctane Sulfonic Acid
perfluorooctanoic acid

Site Environmental Assessment :

Emerging contaminant sampling was completed by the Division of Materials Management under the Inactive Landfill Initiative in October 2017, which included the collection of 3 groundwater samples from existing monitoring wells. Groundwater emerging contaminant results are as follows: PFOA (1.1 ppt to 190 ppt), PFOS (ND to 330 ppt), and 1,4-Dioxane (ND to 1.5 ppb). PFOA and PFOS have also been detected in nearby water supply wells which may be attributable to current or past operations on the property. Additional information will be provided once it becomes available.

Site Health Assessment : As information for this site becomes available, it will be reviewed by the NYSDOH to determine if site contamination presents public health exposure concerns.

SHWS - NY

Facility Name : Hurley Town Landfill
Facility Address : 1043 DUG HILL ROAD, WEST HURLEY, 12491
County : Ulster

Site Details
Site Code : 356062
Program : State Superfund Program
Classification : Potential
EPA ID : N/R
DEC Region : 3
Site Type : N/R

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SHWS - NY ***(cont.)***

Estimated Size :	13 Acres
Latitude :	41.966513932
Longitude :	-74.109235276
Last Date in Agency List :	2022-03-28

Site Owner and Operator Details

Site Owner(s) :	Town of Hurley (Current Owner)
Operator(s) :	N/R
Address :	10 Wamsley Place Hurley,NY, 12443 (Current Owner)

Summary of Project Completion Dates

Completion Date :	N/R
Operable Unit :	N/R
Project Name :	N/R

Site Document Repository Details

Name :	N/R
Address :	N/R

Hazardous Waste Disposal Period

From :	N/R
To :	N/R

Institutional And Engineering Controls Details

Control Type :	N/R
Control Elements :	N/R

Site Description Details

Site Description :

Location: The Hurley Town Landfill is a 13-acre site located approximately 0.6 miles south of the Ashokan Reservoir in the Town of Hurley in Ulster County, bounded by Collier Road to the north and Dug Hill Road to the east. The site is located primarily in a forested area with residential properties to the north. Southwest of the site is West Hurley Park. Site Features: The approximately 9-acre inactive landfill footprint encompasses about three-quarters of the site. The landfill has a domed profile with steep side slopes. A swampy area is located along the western edge of the landfill. The landfill has a leachate collection system which is pumped out periodically by the Town and disposed of at a wastewater treatment plant. The Hurley Highway Department and transfer station complex occupies the southern portion of the site adjacent to the inactive landfill. Access to the site is restricted by a perimeter fence on the east and a cable to restrict entry from the northeast. Current Zoning and Land Use: The site has a property class of Highway Garage according to the Real Property Services tax parcel information. The

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SHWS - NY ***(cont.)***

southern portion of the site is used by the Town of Hurley Highway Department for various maintenance activities including equipment and material storage, vehicle maintenance, and a transfer station. The landfill cap and leachate collection system is maintained by the Town. Past use of the Site: The site historically operated as a municipal solid waste landfill reportedly from the early 1960s to 1996 when it was closed using Landfill Closure State Assistance Program Funds. Besides municipal solid waste, C&D debris, brush, logs, and metal filings from Numrich Arms in West Hurley was reportedly disposed. Closure included an engineered cover system, installation of gas vents, a gas venting trench, and a leachate collection system. Post-closure monitoring was to be conducted for a minimum of five years. Additional information will be provided once it becomes available. Site Geology and Hydrogeology: Local groundwater is expected to flow generally towards the northwest. Additional information will be provided once it becomes available.

Contaminants of Concern : Perfluorooctane Sulfonic Acid
perfluorooctanoic acid

Site Environmental Assessment :

Emerging contaminant sampling was completed by the Division of Materials Management under the Inactive Landfill Initiative in October 2017, which included the collection of 3 groundwater samples from existing monitoring wells. Groundwater emerging contaminant results are as follows: PFOA (1.1 ppt to 190 ppt), PFOS (ND to 330 ppt), and 1,4-Dioxane (ND to 1.5 ppb). PFOA and PFOS have also been detected in nearby water supply wells which may be attributable to current or past operations on the property. Additional information will be provided once it becomes available.

Site Health Assessment : As information for this site becomes available, it will be reviewed by the NYSDOH to determine if site contamination presents public health exposure concerns.

SPILLS - NY

Facility Name : HURLEY LANDFILL
Facility Address : 1043 DUG HILL ROAD, HURLEY, 12491
County : Ulster

Spill Details
Site ID : 612863
Spill Number : 2006990
Program Type : ER
DER Facility ID : 560908
DEC Region : 3
Spill Date : 2020-11-02 14:11:00
Close Date : N/R
Contributing Factor : Unknown
Material Spilled Classification : B1
SWIS Code : 5628
DEC Lead on Spill : DJCHIUSA

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SPILLS - NY ***(cont.)***

Referred to :	N/R
Received Date :	2020-11-02 14:11:00
Computer ID :	N/R
Waterbody :	ASHOKAN RESERVOIR
Source :	Unknown
Reported by :	Health Department
Cleanup Activity Ceased Date :	N/R
Cleanup Meets Standard :	False
Inspection Date :	N/R
Penalty :	N/R
UST Trust :	N/R
Remed Phase :	4
Date Record Created :	2020-11-02 16:51:00
Record Last Updated :	2020-11-02 16:51:14
Spiller Name :	Javier Perez
Spiller Company :	hurley landfill
Spiller Address :	1043 dug hill road, hurley, NY 12491
Spiller Country :	999
Contact Name :	JAVIER PEREZ
Contact Phone :	(845) 338-5412
Contact Extension :	N/R
After Hours :	False
Latitude :	N/R
Longitude :	N/R

Caller Remark :

11/02/2020: In accordance with the procedures of DER-24, the Department of Health requests that actions be taken, such as the provision of an alternate water supply, to reduce exposures to potential impacts from the Hurley Landfill in Hurley, Ulster County for nearby residents with private drinking water wells. DOH discussed the results with 2 of the residents and one is interested in receiving bottled water and the other is undecided. DOH informed them that DEC would be in contact and could explain more about the logistics/process and they could decide then if they would like the water.

DEC Remark :

11/02/2020: In accordance with the procedures of DER-24, the Department of Health requests that actions be taken, such as the provision of an alternate water supply, to reduce exposures to potential impacts from the Hurley Landfill in Hurley, Ulster County for nearby residents with private drinking water wells. DOH discussed the results with 2 of the residents and one is interested in receiving bottled water and the other is undecided. DOH informed them that DEC would be in contact and could explain more about the logistics/process and they could decide then if they would like the water.

Last Date in Agency List : 2021-10-27

Material Details

Spill Number :	2006990
Operable Unit ID :	1359986
Operable Unit :	01
Material ID :	2371685
Material Code :	2729

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SPILLS - NY ***(cont.)***

Material Name :	perfluorooctanoic acid
Case Number :	00335671
Material Family :	Other
Quantity :	.00
Units :	G
Recovered :	.00
Affected Media: Soil :	False
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	True
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	True
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

Facility Name :	HURLEY LANDFILL
Facility Address :	1043 DUG HILL ROAD, WEST HURLEY, 12491
County :	Ulster

Spill Details

Site ID :	612863
Spill Number :	2006990
Program Type :	ER
DER Facility ID :	567961
DEC Region :	3
Spill Date :	2020-11-02 14:11:00
Close Date :	N/R
Contributing Factor :	Unknown
Material Spilled Classification :	B1
SWIS Code :	5628
DEC Lead on Spill :	DJCHIUSA
Referred to :	N/R
Received Date :	2020-11-02 14:11:00
Computer ID :	N/R
Waterbody :	ASHOKAN RESERVOIR
Source :	Unknown
Reported by :	Health Department
Cleanup Activity Ceased Date :	N/R
Cleanup Meets Standard :	False
Inspection Date :	N/R
Penalty :	N/R
UST Trust :	N/R
Remed Phase :	4
Date Record Created :	2020-11-02 16:51:00
Record Last Updated :	2020-11-02 16:51:14
Spiller Name :	Javier Perez
Spiller Company :	hurley landfill
Spiller Address :	1043 dug hill road, hurley, NY 12491

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SPILLS - NY ***(cont.)***

Spiller Country :	999
Contact Name :	JAVIER PEREZ
Contact Phone :	(845) 338-5412
Contact Extension :	N/R
After Hours :	False
Latitude :	N/R
Longitude :	N/R

Caller Remark :

11/02/2020: In accordance with the procedures of DER-24, the Department of Health requests that actions be taken, such as the provision of an alternate water supply, to reduce exposures to potential impacts from the Hurley Landfill in Hurley, Ulster County for nearby residents with private drinking water wells. DOH discussed the results with 2 of the residents and one is interested in receiving bottled water and the other is undecided. DOH informed them that DEC would be in contact and could explain more about the logistics/process and they could decide then if they would like the water.

DEC Remark :

11/02/2020: In accordance with the procedures of DER-24, the Department of Health requests that actions be taken, such as the provision of an alternate water supply, to reduce exposures to potential impacts from the Hurley Landfill in Hurley, Ulster County for nearby residents with private drinking water wells. DOH discussed the results with 2 of the residents and one is interested in receiving bottled water and the other is undecided. DOH informed them that DEC would be in contact and could explain more about the logistics/process and they could decide then if they would like the water.

Last Date in Agency List :	2022-02-03

Material Details

Spill Number :	2006990
Operable Unit ID :	1359986
Operable Unit :	01
Material ID :	2371685
Material Code :	2729
Material Name :	perfluorooctanoic acid
Case Number :	00335671
Material Family :	Other
Quantity :	.00
Units :	G
Recovered :	.00
Affected Media: Soil :	False
Affected Media: Air :	False
Affected Media: Ind Air :	False
Affected Media: Groundwater :	True
Affected Media: Surface Water :	False
Affected Media: Drinking Water :	True
Affected Media: Sewer Line :	False
Affected Media: Impervious Surface :	False
Affected Media: Subway :	False
Affected Media: Utility Conveyance :	False
Oxygenate :	N/R

Map Id: A6
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Town Landfill | HURLEY LANDFILL | Hurley TS (T)
1043 DUG HILL ROAD
WEST HURLEY | HURLEY | Hurley, NY 12491

Database(s) : [AOC - NY, HSWDS - NY, SHWS - NY, SPILLS - NY, SWF/LF - NY] ***(cont.)***

Envirosite ID: 31083377
EPA ID: N/R

SWF/LF - NY

Facility Name :	Hurley TS (T)
Facility Address :	1043 Dug Hill Road, West Hurley, NY 12491
County :	Ulster
Activity Number :	[56R04]
Activity Description :	Transfer station - registration
Active :	Yes
Regulatory Status :	Registration
Authorization Number :	56R04
Authorization Issue Date :	N/R
Expiration Date :	N/R
Waste Types :	MSW (Residential/Institutional & Commercial);Commingled Paper & Containers;Wood (Brush/ Branches/ Trees/ Stumps);Yard Waste; Corrugated Cardboard;Glass;Metals (Ferrous & Non-Ferrous);Electronics; Waste Oil (Other)
Owner Name :	Town of Hurley
Owner Type :	Municipal
Phone Number :	8453384067
Region :	3
East Coordinate :	574159
North Coordinate :	4642623

Activity Number :	[56R04]
Activity Description :	Transfer station - registration
Active :	Yes
Regulatory Status :	Registration
Authorization Number :	56R04
Authorization Issue Date :	N/R
Expiration Date :	N/R
Waste Types :	MSW (Residential/Institutional & Commercial);Commingled Paper & Containers;Wood (Brush/ Branches/ Trees/ Stumps);Yard Waste; Corrugated Cardboard;Glass;Metals (Ferrous & Non-Ferrous);Electronics; Waste Oil (Other)
Owner Name :	Town of Hurley
Owner Type :	Municipal
Phone Number :	8453384067
Region :	3
East Coordinate :	573831
North Coordinate :	4646345

Map Id: A7
Direction:
Distance:
Elevation:
Relative:

Site Name : Hurley Transfer Station
1043 Dud Hill Rd
West Hurley, NY 12491

Database(s) : [DEBRIS EPA SWRCY]

Envirosite ID: 42505245
EPA ID: N/R

DEBRIS EPA SWRCY

Facility Name :	Hurley Transfer Station
Facility Address :	1043 Dud Hill Rd, West Hurley, NY 12491
Phone :	845-338-4067
Region :	2
Recovery :	Yes
Landfill :	No
C D :	No
Composting :	No
Demolition :	No
Electronic :	No
HHW :	No
Metals :	No
Tires :	No
Transfer Station :	Yes
Vehicles :	No
LF C D :	No
LF HW :	No
LF MSW :	No
Latitude :	41.967025
Longitude :	-74.107969
Last Date in Agency List :	2022-02-02

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY]

Envirosite ID: 42896582
EPA ID: N/R

AST PBS - NY

Facility Name :	TOWN OF HURLEY HIGHWAY DEPT.
Facility Address :	1035 DUG HILL ROAD, WEST HURLEY, 12491
County :	Ulster

Site Information

Expiration Date :	2023-06-28
Site ID :	33333
Site Type :	Municipality (Incl. Waste Water Treatment Plants, Utilities, Swimming Pools, etc.)
Site Status :	Active
Program Number :	3-441678
Program Type :	Petroleum Bulk Storage
DEC Region :	3
Last Date in Agency List :	2022-04-19

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

AST PBS - NY ***(cont.)***

Affiliation Details

Affiliation Type :	Emergency Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	999
Phone :	(845) 331-7474
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Facility Owner
Company :	TOWN OF HURLEY
Contact Title :	HIGHWAY SUPERINTENDENT
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	N/R
Country Code :	001
Phone :	(845) 338-4067
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Mail Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	TOWN CLERK
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	#10 WAMSLEY PLACE
Country Code :	001
Phone :	(845) 331-7474
Phone Ext :	N/R
Email :	HIGHWAY@TOWNOFHURLEY.ORG
Fax :	N/R

Affiliation Type :	Facility Operator
Company :	TOWN OF HURLEY HIGHWAY DEPT.
Contact Title :	N/R
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	001
Phone :	(845) 338-4067
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

AST PBS - NY ***(cont.)***

Tank Information :	Tank Information withheld (not releaseable under Freedom of Information Law) in accordance with Public Officers Law Sections 86.5, 87.2(F), 89.5(a)(1)(1-a)

EPA UST

Facility Name :	TOWN OF HURLEY HIGHWAY DEPT.
Facility Address :	1035 DUG HILL ROAD, WEST HURLEY, New York 12491
County :	Ulster
Facility ID :	NY33333
Facility Status :	Open UST(s)
Open USTs :	1
Closed USTs :	3
Temporarily Out of Service USTs :	0
Date of Last Inspection :	N/R
EPA Region :	2
Tribe :	N/R
Facility ID 2 :	N/R
Latitude :	41.964849999999998
Longitude :	-74.109600000000000
Last Date in Agency List :	2021-12-27

Tank Details

Tank ID :	NY113356
Tank Status :	Closed
Installation Date :	1986-10-01
Removal Date :	N/R
Capacity :	2000
Substances :	N/R
Tank Wall Type :	N/R
Tank ID :	NY42175
Tank Status :	Closed
Installation Date :	1983-08-01
Removal Date :	N/R
Capacity :	1000
Substances :	N/R
Tank Wall Type :	N/R
Tank ID :	NY45806
Tank Status :	Closed
Installation Date :	1975-06-01
Removal Date :	N/R
Capacity :	1000
Substances :	N/R
Tank Wall Type :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

EPA UST ***(cont.)***

Tank ID :	NY45807
Tank Status :	Open
Installation Date :	2002-05-20
Removal Date :	N/R
Capacity :	660
Substances :	N/R
Tank Wall Type :	N/R

UST PBS - NY

Facility Name :	TOWN OF HURLEY HIGHWAY DEPT.
Facility Address :	1035 DUG HILL ROAD, WEST HURLEY, 12491
County :	Ulster

Site Information

Expiration Date :	2023-06-28
Site ID :	33333
Site Type :	Municipality (Incl. Waste Water Treatment Plants, Utilities, Swimming Pools, etc.)
Site Status :	Active
Program Number :	3-441678
Program Type :	Petroleum Bulk Storage
DEC Region :	3
Last Date in Agency List :	2022-04-19

Affiliation Details

Affiliation Type :	Emergency Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	999
Phone :	(845) 331-7474
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Affiliation Type :	Facility Owner
Company :	TOWN OF HURLEY
Contact Title :	HIGHWAY SUPERINTENDENT
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	N/R
Country Code :	001
Phone :	(845) 338-4067
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

UST PBS - NY ***(cont.)***

Affiliation Type :	Mail Contact
Company :	TOWN OF HURLEY
Contact Title :	N/R
Contact Name :	TOWN CLERK
Contact Address :	P.O. BOX 569, HURLEY, NY 12443
Contact Address 2 :	#10 WAMSLEY PLACE
Country Code :	001
Phone :	(845) 331-7474
Phone Ext :	N/R
Email :	HIGHWAY@TOWNOFHURLEY.ORG
Fax :	N/R

Affiliation Type :	Facility Operator
Company :	TOWN OF HURLEY HIGHWAY DEPT.
Contact Title :	N/R
Contact Name :	MICHAEL C. SHULTIS
Contact Address :	NN
Contact Address 2 :	N/R
Country Code :	001
Phone :	(845) 338-4067
Phone Ext :	N/R
Email :	N/R
Fax :	N/R

Tank Information

Date Installed :	2002-05-20
Tank ID :	132731
Tank Number :	3
Tank Type :	N/R
Tank Status :	In Service
Capacity :	660
Tank Location :	Underground
Tank Model :	N/R
Pipe Model :	N/R
Test Method :	Testing Not Required
Tank Last Test :	N/R
Tank Next Test Due :	N/R
Close Date :	N/R
Registered :	True
Tank Out of Service Date :	N/R
Tank Owner Name :	N/R
Tank Owner Address :	N/R
Red Tag Start Date :	N/R
Red Tag End Date :	N/R
Subpart :	3
Category :	2
UDC IND :	1
Line Last Test Due :	N/R
Next Line Test Due :	N/R
Line Test Method :	N/R
Class A Opp Name :	N/R
Class B Opp Name :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

UST PBS - NY ***(cont.)***

Tank Equipment

Details for this site have been truncated due to the large number of available details for this site within this dataset. For the complete details for this site, contact your Envirosite account representative for a complimentary site report containing all of the details available.

Type :	Dispenser
Equipment :	Suction Dispenser
Type :	Overfill
Equipment :	Vent Whistle
Type :	Pipe External Protection
Equipment :	Painted/Asphalt Coating
Type :	Pipe Location
Equipment :	Aboveground
Type :	Pipe Type
Equipment :	Steel/Carbon Steel/Iron

Tank Materials

Material Name :	#2 fuel oil (on-site consumption)
Percent :	132731

Tank Information

Date Installed :	1986-10-01
Tank ID :	74755
Tank Number :	2
Tank Type :	N/R
Tank Status :	Closed - Removed
Capacity :	2000
Tank Location :	Underground
Tank Model :	N/R
Pipe Model :	N/R
Test Method :	Testing Not Required
Tank Last Test :	N/R
Tank Next Test Due :	N/R
Close Date :	1998-08-01
Registered :	True
Tank Out of Service Date :	N/R
Tank Owner Name :	N/R
Tank Owner Address :	N/R
Red Tag Start Date :	N/R
Red Tag End Date :	N/R
Subpart :	N/R
Category :	2
UDC IND :	1

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

UST PBS - NY ***(cont.)***

Line Last Test Due :	N/R
Next Line Test Due :	N/R
Line Test Method :	N/R
Class A Opp Name :	N/R
Class B Opp Name :	N/R

Tank Equipment

Type :	Dispenser
Equipment :	Suction Dispenser
Type :	Overfill
Equipment :	None
Type :	Pipe External Protection
Equipment :	None
Type :	Pipe Location
Equipment :	Underground/On-ground
Type :	Pipe Type
Equipment :	Galvanized Steel

Tank Materials

Material Name :	diesel
Percent :	74755

Tank Information

Date Installed :	1983-08-01
Tank ID :	132754
Tank Number :	3-A
Tank Type :	N/R
Tank Status :	Closed - Removed
Capacity :	1000
Tank Location :	Underground
Tank Model :	N/R
Pipe Model :	N/R
Test Method :	Testing Not Required
Tank Last Test :	N/R
Tank Next Test Due :	N/R
Close Date :	2002-05-20
Registered :	True
Tank Out of Service Date :	N/R
Tank Owner Name :	N/R
Tank Owner Address :	N/R
Red Tag Start Date :	N/R
Red Tag End Date :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

UST PBS - NY ***(cont.)***

Subpart :	N/R
Category :	1
UDC IND :	1
Line Last Test Due :	N/R
Next Line Test Due :	N/R
Line Test Method :	N/R
Class A Opp Name :	N/R
Class B Opp Name :	N/R

Tank Equipment

Type :	Dispenser
Equipment :	Suction Dispenser
Type :	Overfill
Equipment :	Vent Whistle
Type :	Pipe External Protection
Equipment :	None
Type :	Pipe Location
Equipment :	Underground/On-ground
Type :	Pipe Type
Equipment :	Copper

Tank Materials

Material Name :	#2 fuel oil (on-site consumption)
Percent :	132754

Tank Information

Date Installed :	1975-06-01
Tank ID :	74754
Tank Number :	1
Tank Type :	N/R
Tank Status :	Closed - Removed
Capacity :	1000
Tank Location :	Underground
Tank Model :	N/R
Pipe Model :	N/R
Test Method :	Testing Not Required
Tank Last Test :	N/R
Tank Next Test Due :	N/R
Close Date :	1998-08-01
Registered :	True
Tank Out of Service Date :	N/R
Tank Owner Name :	N/R

Map Id: A8
Direction:
Distance:
Elevation:
Relative:

Site Name : TOWN OF HURLEY HIGHWAY DEPT.
1035 DUG HILL ROAD
WEST HURLEY, NY 12491

Database(s) : [AST PBS - NY, EPA UST, UST PBS - NY] ***(cont.)***

Envirosite ID: 42896582
EPA ID: N/R

UST PBS - NY ***(cont.)***

Tank Owner Address :	N/R
Red Tag Start Date :	N/R
Red Tag End Date :	N/R
Subpart :	N/R
Category :	1
UDC IND :	1
Line Last Test Due :	N/R
Next Line Test Due :	N/R
Line Test Method :	N/R
Class A Opp Name :	N/R
Class B Opp Name :	N/R

Tank Equipment

Type :	Dispenser
Equipment :	Suction Dispenser
Type :	Overfill
Equipment :	None
Type :	Pipe External Protection
Equipment :	None
Type :	Pipe Location
Equipment :	Underground/On-ground
Type :	Pipe Type
Equipment :	Galvanized Steel

Tank Materials

Material Name :	gasoline
Percent :	74754

ENVIROSITE ID	NAME	ADDRESS	CITY	ZIP	DATABASE(S)
7049118	GETTY #98440	ROUTE 375	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
7092604	GETTY S/S	RT 375	WEST HURLEY		EPA LUST, LTANKS 2 - ...
7336324	HERITAGE ENERGY	WILLIAMS ROAD	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
7292414	HERITAGE OIL CORNER STORE	RT 28	WEST HURLEY		EPA LUST, LTANKS 2 - ...
7056922	HOYT. INC.	WILLIAMS LANE	WEST HURLEY		EPA LUST, LTANKS 2 - ...
7222311	MOBIL | W.HURLEY CORNER S...	W HURLEY CORNER STORE | R...	WEST HURLEY		EPA LUST, LTANKS 2 - ...
7267867	NUSSBAUM	RT 28	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
7321764	STEWARTS	RT 28 CORNER STORE	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
43023050	STEWARTS	RT 28	WEST HURLEY		EPA LUST
32558942	TO ROADWAY TRUCK FIRE	NEAR 39 FLANDERS RD	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
7322087	ULSTER SERVICE AREA NYSTH	MILE POST 96 SOUTH BOUND ...			LTANKS 2 - NY, SPILLS ...
7243977	UNITED PRECISION GUAGES	DIKE RD	WEST HURLEY		LTANKS 2 - NY, SPILLS ...
7267865	V.VANVALKENBURG(FILTERS)	RT 28	WEST HURLEY		EPA LUST, LTANKS 2 - ...

FEDERAL RCRA NON-CORRACTS TSD FACILITIES LIST

ARCHIVED RCRA TSDF: Resource Conservation and Recovery Act hazardous waste transportation storage disposal and treatment facilities

Agency Version Date: 12/30/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

RCRA_TSDF: Resource Conservation and Recovery Act hazardous waste transportation storage disposal and treatment facilities

Agency Version Date: 12/30/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

FEDERAL, STATE, AND TRIBAL REGISTERED STORAGE TANK LISTS

AST PBS: Bulk petroleum terminals with a total bulk storage capacity of 50,000 barrels or more.

Agency Version Date: 02/22/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/20/2022
Agency: Department of Homeland Security
Agency Contact: 202-853-5361
Most Recent Contact: 02/22/2022

EPA UST: Facilities listed in the EPA UST Finder database

Agency Version Date: 11/19/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: EPA
Agency Contact: (202) 566-1667
Most Recent Contact: 02/15/2022

FEMA UST: FEMA underground storage tank listing

Agency Version Date: 10/08/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/27/2022
Agency: FEMA
Agency Contact: 202-212-5283
Most Recent Contact: 04/01/2022

HIST INDIAN UST R6: Historical Underground Storage Tanks on Indian Land in EPA Region 6

Agency Version Date: 12/03/2021
Agency Update Frequency: Semi Annually
Planned Next Contact: 05/27/2022
Agency: U.S. Environmental Protection Agency Region 6
Agency Contact: 855-246-3642
Most Recent Contact: 03/01/2022

HIST INDIAN UST R7: Historical Underground Storage Tanks on Indian Land in EPA Region 7

Agency Version Date: 08/10/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 7
Agency Contact: 855-246-3642
Most Recent Contact: 02/15/2022

INDIAN UST R1: Underground Storage Tanks on Indian Land in EPA Region 1

Agency Version Date: 04/15/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/14/2022
Agency: U.S. Environmental Protection Agency Region 1
Agency Contact: 855-246-3642
Most Recent Contact: 04/15/2022

INDIAN UST R10: Underground Storage Tanks on Indian Land in EPA Region 10

Agency Version Date: 02/14/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 10
Agency Contact: 855-246-3642
Most Recent Contact: 02/14/2022

FEDERAL, STATE, AND TRIBAL REGISTERED STORAGE TANK LISTS (cont.)

INDIAN UST R2: Underground Storage Tanks on Indian Land in EPA Region 2

Agency Version Date: 12/07/2016
Agency Update Frequency: Quarterly
Planned Next Contact: 07/15/2022
Agency: U.S. Environmental Protection Agency Region 2
Agency Contact: 855-246-3642
Most Recent Contact: 04/19/2022

INDIAN UST R4: Underground Storage Tanks on Indian Land in EPA Region 4

Agency Version Date: 02/14/2022
Agency Update Frequency: Semi Annually
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 4
Agency Contact: 855-246-3642
Most Recent Contact: 02/14/2022

INDIAN UST R5: Underground Storage Tanks on Indian Land in EPA Region 5

Agency Version Date: 01/31/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/28/2022
Agency: U.S. Environmental Protection Agency Region 5
Agency Contact: 855-246-3642
Most Recent Contact: 01/31/2022

INDIAN UST R6: Underground Storage Tanks on Indian Land in EPA Region 6

Agency Version Date: 03/01/2022
Agency Update Frequency: Semi Annually
Planned Next Contact: 05/27/2022
Agency: U.S. Environmental Protection Agency Region 6
Agency Contact: 855-246-3642
Most Recent Contact: 03/01/2022

INDIAN UST R7: Underground Storage Tanks on Indian Land in EPA Region 7

Agency Version Date: 01/31/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/28/2022
Agency: U.S. Environmental Protection Agency Region 7
Agency Contact: 855-246-3642
Most Recent Contact: 01/31/2022

INDIAN UST R8: Underground Storage Tanks on Indian Land in EPA Region 8

Agency Version Date: 01/17/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/11/2022
Agency: U.S. Environmental Protection Agency Region 8
Agency Contact: 855-246-3642
Most Recent Contact: 04/14/2022

INDIAN UST R9: Underground Storage Tanks on Indian Land in EPA Region 9

Agency Version Date: 01/17/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/11/2022
Agency: U.S. Environmental Protection Agency Region 9
Agency Contact: 855-246-3642
Most Recent Contact: 04/14/2022

AST CBS - NY: Aboveground Storage Tanks in Chemical Bulk Storage Database

Agency Version Date: 04/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/12/2022

AST PBS - NY: Aboveground Storage Tanks in Petroleum Bulk Storage Database

Agency Version Date: 04/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/12/2022

HIST TANKS SUFFOLK COUNTY - NY: List of Storage Tanks in Suffolk County that are no longer in current agency list.

Agency Version Date: 01/14/2019
Agency Update Frequency: Annually
Planned Next Contact: 05/31/2022
Agency: Department of Health
Agency Contact: 631-854-2516
Most Recent Contact: 03/04/2022

FEDERAL, STATE, AND TRIBAL REGISTERED STORAGE TANK LISTS (cont.)

TANKS CORTLAND COUNTY - NY: Petroleum Bulk Storage Tanks in Cortland County

Agency Version Date: 10/11/2019
Agency Update Frequency: Varies
Planned Next Contact: 06/14/2022
Agency: Department of Health
Agency Contact: 607-753-5035
Most Recent Contact: 03/18/2022

TANKS MOSF - NY: Major Oil Storage Facilities Database with capacities greater than 400 000 gallons

Agency Version Date: 04/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/12/2022

TANKS NASSAU COUNTY - NY: Storage Tanks in Nassau County

Agency Version Date: 04/09/2013
Agency Update Frequency: No update
Planned Next Contact: 07/12/2022
Agency: Fire Commissioner
Agency Contact: 516-572-1041
Most Recent Contact: 04/14/2022

TANKS ROCKLAND COUNTY - NY: Storage Tanks in Rockland County

Agency Version Date: 12/05/2017
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 05/03/2022
Agency: Department of Health
Agency Contact: 845-364-2604
Most Recent Contact: 02/04/2022

TANKS SUFFOLK COUNTY - NY: Storage Tanks in Suffolk County

Agency Version Date: 01/14/2019
Agency Update Frequency: Varies
Planned Next Contact: 06/16/2022
Agency: Department of Health
Agency Contact: 631-854-2516
Most Recent Contact: 03/18/2022

TANKS WESTCHESTER COUNTY - NY: Storage Tanks in Westchester County

Agency Version Date: 02/14/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/12/2022
Agency: Department of Health
Agency Contact: 914-813-5000
Most Recent Contact: 02/14/2022

UST CBS - NY: Underground Storage Tanks in Chemical Bulk Storage Database

Agency Version Date: 04/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/12/2022

UST PBS - NY: Underground Storage Tanks in Petroleum Bulk Storage Database

Agency Version Date: 04/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/12/2022

FEDERAL CERCLIS LIST

CERCLIS NFRAP: The CERCLIS sites with No Further Remedial Action Planned from the CERCLIS program database. The Environmental Protection Agency decommissioned the CERCLIS data in 2014. The last update was November 12, 2013.

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 01/28/2022

FEDERAL CERCLIS LIST (cont.)

CERCLIS-HIST: The CERCLIS program database contains information on the assessment and remediation of federal hazardous waste sites. The Environmental Protection Agency decommissioned the CERCLIS data in 2014. The last update was November 12, 2013.

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 01/28/2022

EPA SAA: Listing of Sites with Superfund Alternative Approach Agreements.

Agency Version Date: 11/01/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 04/25/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 01/27/2022

FEDERAL FACILITY: Sites where Federal Facilities Restoration and Reuse Office (FFRRO) arranged cleanup for Base Closure and Property Transfer at Federal Facilities

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8712
Most Recent Contact: 01/28/2022

SEMS_8R_ACTIVE SITES: The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. NPL sites include latitude and longitude information. For non-NPL sites, a brief site status is provided.

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

SEMS_8R_ARCHIVED SITES: The Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time.

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

FEDERAL RCRA CORRACTS FACILITIES LIST

CORRACTS: List of facilities where Resource Conservation and Recovery Act Corrective Action Program used to investigate and remediate hazardous releases

Agency Version Date: 12/30/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-1667
Most Recent Contact: 03/28/2022

HIST CORRACTS 2: List of facilities where Resource Conservation and Recovery Act Corrective Action Program used to investigate and remediate hazardous releases that are no longer in current agency list.

Agency Version Date: 10/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/23/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-1667
Most Recent Contact: 02/24/2022

FEDERAL DELISTED NPL SITE LIST

DELISTED NPL: National Priority List of sites that were delisted and no longer require action

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

FEDERAL DELISTED NPL SITE LIST (cont.)

DELISTED PROPOSED NPL: Sites that have been delisted from the proposed National Priority List

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

SEMS_DELETED NPL: All Deleted National Priority List Sties

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

FEDERAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS

EPA LF MOP: Sites in the EPA Landfill Methane Outreach Program

Agency Version Date: 03/25/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/21/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 03/25/2022

FEDERAL, STATE, AND TRIBAL LEAKING STORAGE TANK LISTS

EPA LUST: Releases listed in the EPA UST Finder database

Agency Version Date: 11/19/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: EPA
Agency Contact: (202) 566-1667
Most Recent Contact: 02/15/2022

HIST INDIAN LUST R4: Historical Leaking Underground Storage Tanks on Indian Land in EPA Region 4

Agency Version Date: 08/23/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 4
Agency Contact: 855-246-3642
Most Recent Contact: 02/15/2022

HIST INDIAN LUST R8: Historical Leaking Underground Storage Tanks on Indian Land in EPA Region 8

Agency Version Date: 08/16/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/04/2022
Agency: U.S. Environmental Protection Agency Region 8
Agency Contact: 855-246-3642
Most Recent Contact: 02/07/2022

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land in EPA Region 1

Agency Version Date: 10/21/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 07/14/2022
Agency: U.S. Environmental Protection Agency Region 1
Agency Contact: 855-246-3642
Most Recent Contact: 04/15/2022

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land in EPA Region 10

Agency Version Date: 02/14/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 10
Agency Contact: 855-246-3642
Most Recent Contact: 02/14/2022

INDIAN LUST R2: Leaking Underground Storage Tanks on Indian Land in EPA Region 2

Agency Version Date: 12/07/2016
Agency Update Frequency: Quarterly
Planned Next Contact: 07/15/2022
Agency: U.S. Environmental Protection Agency Region 2
Agency Contact: 855-246-3642
Most Recent Contact: 04/19/2022

FEDERAL, STATE, AND TRIBAL LEAKING STORAGE TANK LISTS (cont.)

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land in EPA Region 4

Agency Version Date: 02/14/2022
Agency Update Frequency: Semi Annually
Planned Next Contact: 05/12/2022
Agency: U.S. Environmental Protection Agency Region 4
Agency Contact: 855-246-3642
Most Recent Contact: 02/14/2022

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land in EPA Region 5

Agency Version Date: 01/31/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/28/2022
Agency: U.S. Environmental Protection Agency Region 5
Agency Contact: 855-246-3642
Most Recent Contact: 01/31/2022

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land in EPA Region 6

Agency Version Date: 02/03/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/02/2022
Agency: U.S. Environmental Protection Agency Region 6
Agency Contact: 855-246-3642
Most Recent Contact: 02/03/2022

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land in EPA Region 7

Agency Version Date: 08/10/2021
Agency Update Frequency: Varies
Planned Next Contact: 04/28/2022
Agency: U.S. Environmental Protection Agency Region 7
Agency Contact: 855-246-3642
Most Recent Contact: 01/31/2022

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land in EPA Region 8

Agency Version Date: 02/04/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/03/2022
Agency: U.S. Environmental Protection Agency Region 8
Agency Contact: 855-246-3642
Most Recent Contact: 02/04/2022

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land in EPA Region 9

Agency Version Date: 04/14/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/11/2022
Agency: U.S. Environmental Protection Agency Region 9
Agency Contact: 855-246-3642
Most Recent Contact: 04/14/2022

LTANKS - NY: Leaking Storage Tank Incidents

Agency Version Date: 02/07/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/05/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 02/07/2022

LTANKS 2 - NY: Facilities with Leaking Storage Tanks Data

Agency Version Date: 03/07/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/01/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-9543
Most Recent Contact: 03/07/2022

FEDERAL ERNS LIST

ERNS: Emergency Response Notification System records of reported spills

Agency Version Date: 01/21/2022
Agency Update Frequency: Annually
Planned Next Contact: 07/15/2022
Agency: National Response Center United States Coast Guard
Agency Contact: N/R
Most Recent Contact: 04/19/2022

FEDERAL INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES

FED E C: Federal listing of remediation sites with engineering controls

Agency Version Date: 02/22/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/20/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 02/22/2022

FED I C: Federal listing of remediation sites with institutional controls

Agency Version Date: 02/22/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/20/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 02/22/2022

RCRA IC_EC: Sites with institutional or engineering controls related to Resource Conservation and Recovery Act

Agency Version Date: 02/04/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/03/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 02/04/2022

FEDERAL RCRA GENERATORS LIST

HIST RCRA_CESQG: List of Resource Conservation and Recovery Act licensed conditionally exempt small quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/23/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 02/24/2022

HIST RCRA_LQG: List of Resource Conservation and Recovery Act licensed large quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/23/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 02/24/2022

HIST RCRA_NONGEN: List of Resource Conservation and Recovery Act licensed non-generators that are no longer in current agency list.

Agency Version Date: 10/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/23/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 02/24/2022

HIST RCRA_SQG: List of Resource Conservation and Recovery Act licensed small quantity generators that are no longer in current agency list.

Agency Version Date: 10/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/23/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 02/24/2022

RCRA_LQG: Resource Conservation and Recovery Act listing of licensed large quantity generators

Agency Version Date: 12/30/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

RCRA_NONGEN: Resource Conservation and Recovery Act listing of licensed non-generators

Agency Version Date: 12/30/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

FEDERAL RCRA GENERATORS LIST (cont.)

RCRA_SQG: Resource Conservation and Recovery Act listing of licensed small quantity generators

Agency Version Date: 12/30/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

RCRA_VSQG: Resource Conservation and Recovery Act listing of licensed very small quantity generators.

Agency Version Date: 12/30/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/22/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 215-814-2469
Most Recent Contact: 03/28/2022

FEDERAL NPL SITE LIST

NPL: List of priority contaminated sites among identified releases or threatened releases of hazardous substances pollutants or contaminants nationally

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

NPL EPA R1 GIS: Geospatial data for the Environmental Protection Agency Region 1 National Priority List subject to environmental regulation

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-2132
Most Recent Contact: 01/28/2022

NPL EPA R3 GIS: Geospatial data for the Environmental Protection Agency Region 3 National Priority List subject to environmental regulation

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-2132
Most Recent Contact: 01/28/2022

NPL EPA R6 GIS: Geospatial data for the Environmental Protection Agency Region 6 National Priority List subject to environmental regulation

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-2132
Most Recent Contact: 01/28/2022

NPL EPA R8 GIS: Geospatial data for the Environmental Protection Agency Region 8 National Priority List subject to environmental regulation

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-2132
Most Recent Contact: 01/28/2022

NPL EPA R9 GIS: Geospatial data for the Environmental Protection Agency Region 9 National Priority List subject to environmental regulation

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-2132
Most Recent Contact: 01/28/2022

FEDERAL NPL SITE LIST (cont.)

PART NPL: Sites that are a part of an National Priority List site referred to as the parent site

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

PROPOSED NPL: Sites that have been proposed for the National Priority List

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

SEMS_FINAL NPL: All Included National Priority List Sites

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

SEMS_PROPOSED NPL: All Proposed National Priority List Sites

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

STATE AND TRIBAL BROWNFIELD SITES

TRIBAL BROWNFIELDS: Tribal brownfield remediation site listing

Agency Version Date: 02/10/2017
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 06/10/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 03/16/2022

BROWNFIELDS - NY: Locations determined to be Brownfield Sites

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

HIST BROWNFIELDS - NY: List of locations determined to be Brownfield Sites that are no longer in agency list.

Agency Version Date: 08/13/2018
Agency Update Frequency: Annually
Planned Next Contact: 06/13/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 03/16/2022

STATE- AND TRIBAL - EQUIVALENT CERCLIS

DEL SHWS - NY: Inactive Sites: Superfund (Class C)

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

HSWDS - NY: All suspected/known hazardous substance waste disposal sites

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (212) 720-3300
Most Recent Contact: 04/07/2022

STATE- AND TRIBAL - EQUIVALENT CERCLIS (cont.)

SHWS - NY: The State Superfund program: Inactive Hazardous Waste Disposal Sites in New York State

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

STATE RCRA GENERATORS LIST

HWG - NY: Resource Conservation and Recovery Site Listings

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

STATE INSTITUTIONAL CONTROLS / ENGINEERING CONTROLS REGISTRIES

IC EC - NY: Engineering & Institutional Controlled sites

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

STATE AND TRIBAL LANDFILL AND/OR SOLID WASTE DISPOSAL SITE LISTS

SWF/LF - NY: Solid Waste Landfills

Agency Version Date: 01/21/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/15/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 04/19/2022

STATE AND TRIBAL VOLUNTARY CLEANUP SITES

VCP - NY: Sites involved in the Voluntary Cleanup Program

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

LOCAL BROWNFIELD LISTS

BROWNFIELDS-ACRES: EPA Brownfields Assessment, Cleanup and Redevelopment Exchange System.

Agency Version Date: 09/17/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/06/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 03/10/2022

FED BROWNFIELDS: Federal brownfield remediation sites

Agency Version Date: 01/24/2022
Agency Update Frequency: Semi Annually
Planned Next Contact: 07/18/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 04/21/2022

LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES

FED CDL: The U.S. Department of Justice listing of clandestine drug lab locations

Agency Version Date: 04/11/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/07/2022
Agency: U.S. Department of Justice
Agency Contact: 202-307-7610
Most Recent Contact: 04/11/2022

LOCAL LISTS OF HAZARDOUS WASTE / CONTAMINATED SITES (cont.)

US HIST CDL: The U.S. Department of Justice historical listing of clandestine drug lab locations

Agency Version Date: 08/05/2019
Agency Update Frequency: Quarterly
Planned Next Contact: 05/16/2022
Agency: U.S. Department of Justice
Agency Contact: 202-307-7610
Most Recent Contact: 02/16/2022

LOCAL LISTS OF LANDFILL / SOLID WASTE DISPOSAL SITES

HIST INDIAN ODI R8: List of Region 8 Indian land open dump inventory sites maintained within the STARS program that is no longer in current agency list.

Agency Version Date: 11/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 07/04/2022
Agency: Indian Health Service
Agency Contact: 855-246-3642
Most Recent Contact: 04/07/2022

INDIAN ODI R8: Region 8 Indian land open dump inventory sites maintained within the STARS program

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: Indian Health Service
Agency Contact: 855-246-3642
Most Recent Contact: 01/28/2022

ODI: Open dump inventory sites

Agency Version Date: 10/03/2017
Agency Update Frequency: No Update
Planned Next Contact: 05/10/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 02/11/2022

TRIBAL ODI: Indian land open dump inventory for all regions

Agency Version Date: 02/21/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/19/2022
Agency: Indian Health Service
Agency Contact: 301-443-3593
Most Recent Contact: 02/21/2022

HIST SWTIRE - NY: List of Solid Waste Tire Facilities that are no longer in current agency list.

Agency Version Date: 05/17/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/06/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 02/08/2022

SWRCY - NY: Active Recyclables Handling & Recovery Facilities

Agency Version Date: 01/21/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/15/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 04/19/2022

SWTIRE - NY: Solid Waste Tire Facilities

Agency Version Date: 04/06/2022
Agency Update Frequency: No update
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 04/06/2022

RECORDS OF EMERGENCY RELEASE REPORTS

HMIRS (DOT): Hazardous Material spills reported by the Department of Transportation

Agency Version Date: 03/18/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/14/2022
Agency: U.S. Department of Transportation
Agency Contact: (202) 366-4996
Most Recent Contact: 03/18/2022

RECORDS OF EMERGENCY RELEASE REPORTS (cont.)

HIST SPILLS - NY: List of confirmed spill sites that is no longer in current agency list.

Agency Version Date: 10/09/2017
Agency Update Frequency: Annually
Planned Next Contact: 05/06/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-9543
Most Recent Contact: 02/08/2022

SPILLS - NY: Confirmed Spill Sites

Agency Version Date: 03/07/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/01/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-9543
Most Recent Contact: 03/07/2022

LOCAL LAND RECORDS

LIENS 2: Comprehensive Environmental Response Compensation and Liability Act sites with liens

Agency Version Date: 05/11/2017
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 06/13/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 800-424-9346
Most Recent Contact: 03/16/2022

OTHER ASCERTAINABLE RECORDS

AFS: Air Facility Systems Quarterly Extract

Agency Version Date: 01/31/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/28/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 01/31/2022

ALT FUELING: Alternative Fueling Stations by fuel type.

Agency Version Date: 03/25/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/21/2022
Agency: U.S. Department of Energy
Agency Contact: N/R
Most Recent Contact: 03/25/2022

BRS: Reporting of hazardous waste generation and management from large quantity generators

Agency Version Date: 12/30/2021
Agency Update Frequency: Biennial
Planned Next Contact: 06/22/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/28/2022

CDC HAZDAT: The Agency for Toxic Substances and Disease Registry's Hazardous Substance Release/Health Effects Database.

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: Agency for Toxic Substances and Disease Registry
Agency Contact: 770-488-6399
Most Recent Contact: 01/28/2022

COAL ASH DOE: List of existing and planned generators with 1 megawatt or greater of combined capacity that are utilizing coal ash impoundments.

Agency Version Date: 09/29/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/16/2022
Agency: Department of Energy
Agency Contact: (202) 586-8800
Most Recent Contact: 03/22/2022

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

Agency Version Date: 02/18/2021
Agency Update Frequency: Varies
Planned Next Contact: 04/29/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 02/01/2022

OTHER ASCERTAINABLE RECORDS (cont.)

COAL GAS: Manufactured Gas Plant locations

Agency Version Date: 01/07/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/01/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 04/04/2022

COLLEGES: List of major Universities & Colleges

Agency Version Date: 04/15/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/13/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/15/2022

COLLEGES 2: List of Universities & Colleges

Agency Version Date: 02/08/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/14/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/18/2022

CONSENT (DECREES): Legal decisions regarding responsibility for Superfund locations

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: Environmental Protection Agency
Agency Contact: (800) 424-9346
Most Recent Contact: 01/28/2022

CORRECTIVE ACTIONS_2020: In 2009 the EPA created the 2020 Corrective Action Baseline list of contaminated or potentially contaminated sites with a cleanup goal to complete 95% by the year 2020. The names on the list indicate the facility owners who may or may not have caused the contamination.

Agency Version Date: 12/21/2018
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 07/15/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: N/R
Most Recent Contact: 04/19/2022

DEBRIS EPA LF: EPA list of designated landfill facilities for the safe disposal of disaster debris.

Agency Version Date: 01/14/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 04/12/2022

DEBRIS EPA SWRCY: EPA list of facilities for the safe recovery, recycling, and disposal of disaster debris.

Agency Version Date: 01/14/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/08/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 04/12/2022

DOD: Department of Defense sites from the Protected Areas Database (PAD-US)

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: United States Geologic Survey (USGS)
Agency Contact: 1-888-275-8747
Most Recent Contact: 01/28/2022

DOT OPS: Incident Data Report

Agency Version Date: 02/14/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/12/2022
Agency: U.S. Department of Transportation
Agency Contact: (202) 366-4996
Most Recent Contact: 02/14/2022

OTHER ASCERTAINABLE RECORDS (cont.)

ECHO: ECHO is EPA Enforcement and Compliance History Online website to search for facilities in your community to assess their compliance with environmental regulations related to CAA, CWA, RCRA, & SDWA.

Agency Version Date: 03/22/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/16/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 202-566-1667
Most Recent Contact: 03/22/2022

ENOI: The Electronic Notice of Intent (eNOI) database contains construction sites and industrial facilities that submit permit requests to EPA for Construction General Permits (CGP) and Multi-Sector General Permits (MSGP).

Agency Version Date: 03/19/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 06/02/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/08/2022

EPA FUELS: List of companies and facilities registered to participate in EPA Fuel Programs under Title 40 CFR Part 80.

Agency Version Date: 02/04/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/03/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: (202) 564-2307
Most Recent Contact: 02/04/2022

EPA OSC: Listing of oil spills and hazardous substance release sites requiring EPA On-Site Coordinators.

Agency Version Date: 03/17/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/13/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: (202) 564-2307
Most Recent Contact: 03/17/2022

EPA WATCH: The EPA Watch List was used to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. EPA maintained the lists from 2011 - 2013.

Agency Version Date: 02/09/2018
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 06/13/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: (202) 564-2307
Most Recent Contact: 03/16/2022

FA HWF: Hazardous Waste Facilities with Financial Assurance

Agency Version Date: 04/04/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/30/2022
Agency: Environmental Protection Agency
Agency Contact: (800) 424-9346
Most Recent Contact: 04/04/2022

FEDLAND: Federal Lands from the Protected Areas Database (PAD-US)

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: United States Geologic Survey (USGS)
Agency Contact: 1-888-275-8747
Most Recent Contact: 01/28/2022

FRS: Facility Registry Systems

Agency Version Date: 02/09/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/06/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 02/09/2022

FTTS: Tracking of administrative and enforcement activities related to FIFRA/TSCA

Agency Version Date: 04/06/2013
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 06/28/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-2280
Most Recent Contact: 04/01/2022

OTHER ASCERTAINABLE RECORDS (cont.)

FTTS INSP: Tracking of inspections related to FIFRA/TSCA

Agency Version Date: 05/08/2017
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-2280
Most Recent Contact: 03/25/2022

FUDS: Defense sites that require cleanup

Agency Version Date: 02/07/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/05/2022
Agency: US Army Corps of Engineering
Agency Contact: (202) 761-0011
Most Recent Contact: 02/07/2022

HIST AFS: List of Air Facility Systems Quarterly Extract that are no longer in current agency list.

Agency Version Date: 06/14/2019
Agency Update Frequency: Quarterly
Planned Next Contact: 06/10/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/16/2022

HIST AFS 2: List of Air Facility Systems Quarterly Extract that are no longer in current agency list.

Agency Version Date: 11/26/2018
Agency Update Frequency: Quarterly
Planned Next Contact: 07/11/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 04/14/2022

HIST DOD: Department of Defense historical sites

Agency Version Date: 01/28/2022
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 04/26/2022
Agency: Environmental Protection Agency
Agency Contact: (800) 424-9346
Most Recent Contact: 01/28/2022

HIST LEAD_SMELTER: List of former lead smelter sites that is no longer in current agency list.

Agency Version Date: 12/12/2018
Agency Update Frequency: Annually
Planned Next Contact: 06/28/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 04/01/2022

HIST MLTS: List of sites in possession/use of radioactive materials regulated by NRC that is no longer in current agency list.

Agency Version Date: 07/13/2016
Agency Update Frequency: Annually
Planned Next Contact: 07/07/2022
Agency: Nuclear Regulatory Commission
Agency Contact: (800) 397-4209
Most Recent Contact: 04/11/2022

HIST PCB TRANS: List of PCB Disposal Facilities that are no longer in current agency list.

Agency Version Date: 01/18/2018
Agency Update Frequency: No Update
Planned Next Contact: 05/03/2022
Agency: Environmental Protection Agency
Agency Contact: (703) 308-8404
Most Recent Contact: 02/04/2022

HIST PCS ENF: List of permitted facilities to discharge wastewater (Federal equivalent to NPDES) that are no longer in current agency list.

Agency Version Date: 12/08/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/17/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-6582
Most Recent Contact: 02/18/2022

OTHER ASCERTAINABLE RECORDS (cont.)

HIST PCS FACILITY: List of Permitted facilities to discharge wastewater (Federal equivalent to NPDES) that are no longer in current agency list.

Agency Version Date: 12/18/2018
Agency Update Frequency: Annually
Planned Next Contact: 05/17/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-6582
Most Recent Contact: 02/18/2022

HIST SSTS: List of tracking of facilities who produce pesticides and their quantity that are no longer in current agency list.

Agency Version Date: 02/13/2019
Agency Update Frequency: Annually
Planned Next Contact: 05/06/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 02/08/2022

HOSPITALS: List of major Hospitals

Agency Version Date: 04/15/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/13/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/15/2022

HWC DOCKET: Listing of Federal facilities which are managing or have managed hazardous waste; or have had a release of hazardous waste.

Agency Version Date: 11/09/2021
Agency Update Frequency: Quarterly
Planned Next Contact: 05/03/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: (202) 564-2307
Most Recent Contact: 02/03/2022

ICIS: Comprised of all Federal Administrative and Judicial enforcement information [intended to replace PCS] by tracking enforcement and compliance information (also contains what used to be known as FFTS)

Agency Version Date: 12/28/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/25/2022

INACTIVE PCS: Inactive Permitted facilities to discharge wastewater

Agency Version Date: 12/28/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-6582
Most Recent Contact: 03/25/2022

INDIAN RESERVATION: American Indian Lands from the Protected Areas Database (PAD-US)

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: United States Geologic Survey (USGS)
Agency Contact: 1-888-275-8747
Most Recent Contact: 01/28/2022

LUCIS: Land Use Control Information Systems

Agency Version Date: 03/18/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/16/2022
Agency: Department of the Navy: BRAC PMO
Agency Contact: (619) 532-0900
Most Recent Contact: 03/18/2022

LUCIS 2: Land Use Control Information Systems

Agency Version Date: 01/17/2018
Agency Update Frequency: No Longer Maintained
Planned Next Contact: 05/03/2022
Agency: Department of the Navy: BRAC PMO
Agency Contact: (619) 532-0900
Most Recent Contact: 02/04/2022

OTHER ASCERTAINABLE RECORDS (cont.)

MANIFEST EPA: EPA Hazardous Waste Electronic Manifest System (e-Manifest)

Agency Version Date: 02/08/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/06/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 02/08/2022

MINE OPERATIONS: Mine plants and operations for commodities monitored by the National Minerals Information Center of the USGS

Agency Version Date: 02/11/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/10/2022
Agency: USGS Mineral Resources Program
Agency Contact: (703) 648-5953
Most Recent Contact: 02/11/2022

MINES: Mines Master Index Files

Agency Version Date: 03/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/23/2022
Agency: Department of Labor
Agency Contact: (202) 693-9400
Most Recent Contact: 03/28/2022

MINES USGS: Listing of all active mines and mineral plants in 2003

Agency Version Date: 02/11/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/10/2022
Agency: USGS Mineral Resources Program
Agency Contact: (703) 648-5953
Most Recent Contact: 02/11/2022

MLTS: Sites in possession/use of radioactive materials regulated by NRC

Agency Version Date: 01/21/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/15/2022
Agency: Nuclear Regulatory Commission
Agency Contact: (800) 397-4209
Most Recent Contact: 04/19/2022

NPL AOC: Areas of Concern related to NPL remediation sites

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: Environmental Protection Agency
Agency Contact: N/R
Most Recent Contact: 01/28/2022

NPL LIENS: National Priority List of sites with Liens

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

NURSING HOMES: List of Nursing Homes

Agency Version Date: 01/14/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/08/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/12/2022

OSHA: OSHA's listing of inspections violations and fatality information

Agency Version Date: 12/27/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/20/2022
Agency: Occupational Safety & Health Administration
Agency Contact: 800-321-6742
Most Recent Contact: 03/24/2022

PADS: Listing of generators transporters commercial store/ brokers and disposers of PCB

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: Environmental Protection Agency
Agency Contact: (703) 308-8404
Most Recent Contact: 01/28/2022

OTHER ASCERTAINABLE RECORDS (cont.)

PCB TRANSFORMER: Disposal and Storage of Polychlorinated Biphenyl (PCB) Waste

Agency Version Date: 02/11/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 05/10/2022
Agency: Environmental Protection Agency
Agency Contact: (703) 308-8404
Most Recent Contact: 02/11/2022

PCS ENF: Permitted facilities to discharge wastewater (Federal equivalent to NPDES)

Agency Version Date: 03/25/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-6582
Most Recent Contact: 03/25/2022

PCS FACILITY: Permitted facilities to discharge wastewater (Federal equivalent to NPDES)

Agency Version Date: 12/28/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-6582
Most Recent Contact: 03/25/2022

PFAS NPL: List of NPL sites with PFAS or PFOA contamination

Agency Version Date: 04/01/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/28/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 04/01/2022

PFAS TRIS: List of TRIS sites where PFAS or PFOA are used/manufactured/ treated/ transported/released.

Agency Version Date: 03/25/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/25/2022

PFAS UCMR3: List of PWS wells sampled for Unregulated Contaminant Monitoring Rule (UCMR)

Agency Version Date: 03/08/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 06/02/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 03/08/2022

RAATS: Listing of major violators with enforcement actions issued under RCRA. Includes administrative and civil actions filed by the EPA. This dataset is no longer maintained.

Agency Version Date: 09/23/2019
Agency Update Frequency: Varies
Planned Next Contact: 07/14/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 04/18/2022

RADINFO: EPA regulated facilities with radiation and radioactive materials

Agency Version Date: 08/01/2019
Agency Update Frequency: Varies
Planned Next Contact: 06/30/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 04/06/2022

RMP: Facilities producing/handling/ process/ distribute/ store specific chemicals report plans required by the Clean Air Act

Agency Version Date: 01/04/2022
Agency Update Frequency: Monthly
Planned Next Contact: 06/28/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 564-2534
Most Recent Contact: 04/01/2022

ROD: Permanent remedy at an NPL site

Agency Version Date: 01/28/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/26/2022
Agency: Environmental Protection Agency
Agency Contact: (800) 424-9346
Most Recent Contact: 01/28/2022

OTHER ASCERTAINABLE RECORDS (cont.)

SCHOOLS PRIVATE: List of Private Schools

Agency Version Date: 04/15/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/13/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/15/2022

SCHOOLS PUBLIC: List of Public Schools

Agency Version Date: 02/08/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/13/2022
Agency: DHS Homeland Infrastructure Foundation
Agency Contact: N/R
Most Recent Contact: 04/15/2022

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners

Agency Version Date: 03/02/2022
Agency Update Frequency: No Update
Planned Next Contact: 05/27/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/02/2022

SEMS_SMELTER: This report includes sites that have smelting-related, or potentially smelting-related, indicators in the SEMS database. The report includes information on the site location as well as contaminants of concern.

Agency Version Date: 01/28/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 04/26/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 703-603-8867
Most Recent Contact: 01/28/2022

SSTS: Tracking of facilities who produce pesticides and their quantity

Agency Version Date: 03/08/2022
Agency Update Frequency: Annually
Planned Next Contact: 06/02/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/08/2022

STORMWATER: Permitted storm water sites

Agency Version Date: 03/18/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/14/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/18/2022

TOSCA-PLANT: Plants controlled by the Toxic Substance Control Act

Agency Version Date: 03/14/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/09/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/14/2022

TRIS: Information regarding toxic chemicals that are being used/manufactured/ treated/ transported/released into the environment

Agency Version Date: 03/25/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: Environmental Protection Agency
Agency Contact: (202) 566-1667
Most Recent Contact: 03/25/2022

UMTRA: Uranium Recovery Sites

Agency Version Date: 07/08/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/21/2022
Agency: United States Nuclear Regulatory Commission
Agency Contact: (301) 415-8200
Most Recent Contact: 03/25/2022

OTHER ASCERTAINABLE RECORDS (cont.)

VAPOR: EPA Vapor Intrusion Database

Agency Version Date: 03/19/2021
Agency Update Frequency: Varies
Planned Next Contact: 06/03/2022
Agency: U.S. Environmental Protection Agency
Agency Contact: 855-246-3642
Most Recent Contact: 03/08/2022

AIRS - NY: Air emissions data

Agency Version Date: 01/25/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/20/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8403
Most Recent Contact: 04/22/2022

AOC - NY: GIS coverage for the air quality division waste program division and water quality division sites of interest

Agency Version Date: 01/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/07/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8403
Most Recent Contact: 04/11/2022

COAL ASH - NY: Coal Ash Disposal Sites

Agency Version Date: 03/11/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/09/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 03/11/2022

DAYCARE - NY: Daycare Facilities

Agency Version Date: 01/26/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/20/2022
Agency: Office of Children and Family Services
Agency Contact: (518) 474-9454
Most Recent Contact: 04/22/2022

DAYCARE NYC - NY: Daycare in NYC boroughs

Agency Version Date: 01/25/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/20/2022
Agency: New York City Department of Health and Mental Hygiene
Agency Contact: 212-341-0900
Most Recent Contact: 04/22/2022

DRYCLEANERS - NY: Sites with Drycleaners

Agency Version Date: 01/25/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/18/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8403
Most Recent Contact: 04/20/2022

E DESIGNATION - NY: Sites with environmental requirements

Agency Version Date: 02/15/2022
Agency Update Frequency: Varies
Planned Next Contact: 05/12/2022
Agency: Department of City Planning
Agency Contact: (212) 788-9956
Most Recent Contact: 02/15/2022

ERP - NY: Environmental Restoration Program Sites Listing

Agency Version Date: 01/10/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/04/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8013
Most Recent Contact: 04/07/2022

FA 1 - NY: FA for Hazardous Waste Facilities

Agency Version Date: 03/02/2021
Agency Update Frequency: Annually
Planned Next Contact: 05/13/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-9167
Most Recent Contact: 02/15/2022

OTHER ASCERTAINABLE RECORDS (cont.)

FA 2 - NY: FA for Solid Waste Facilities

Agency Version Date: 01/21/2022
Agency Update Frequency: Varies
Planned Next Contact: 07/14/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8678
Most Recent Contact: 04/18/2022

HIST DRYCLEANERS - NY: List of sites with Drycleaners that are no longer in current agency list.

Agency Version Date: 05/26/2020
Agency Update Frequency: Varies
Planned Next Contact: 07/21/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8403
Most Recent Contact: 04/25/2022

HIST MANIFEST - NY: Hazardous Waste Manifest tracking records 1980-2006

Agency Version Date: 03/18/2017
Agency Update Frequency: Quarterly
Planned Next Contact: 06/17/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8730
Most Recent Contact: 03/23/2022

MANIFEST - NY: Hazardous Waste Manifest tracking waste from generator to TSD

Agency Version Date: 03/24/2022
Agency Update Frequency: Varies
Planned Next Contact: 06/20/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8730
Most Recent Contact: 03/24/2022

PFAS - NY: List of sites and areas of interest from PFOA/PFOS Facility Identification Survey.

Agency Version Date: 01/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/07/2022
Agency: Department of Environmental Conservation
Agency Contact: N/R
Most Recent Contact: 04/11/2022

PFAS AFFF - NY: List of sites and areas of interest from Class B Fire Suppression Foam Usage Survey for Fire Departments, Bulk Storage Facilities, Airports, DOD Facilities.

Agency Version Date: 01/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/07/2022
Agency: Department of Environmental Conservation
Agency Contact: N/R
Most Recent Contact: 04/11/2022

PFAS AFFF 2 - NY: List of sites and areas of interest from Class B Fire Suppression Foam Usage Survey for New York State Fire Training Centers.

Agency Version Date: 01/12/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/07/2022
Agency: Department of Environmental Conservation
Agency Contact: N/R
Most Recent Contact: 04/11/2022

RES DECL - NY: Restriction placed on the future use of the property

Agency Version Date: 01/27/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/21/2022
Agency: Department of City Planning
Agency Contact: (212) 720-3300
Most Recent Contact: 04/25/2022

SPDES - NY: Sites with SPDES Permits

Agency Version Date: 02/01/2022
Agency Update Frequency: Varies
Planned Next Contact: 04/28/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8210
Most Recent Contact: 02/01/2022

OTHER ASCERTAINABLE RECORDS (cont.)

UIC - NY: Regulated Underground Injection Controlled wells

Agency Version Date: 01/24/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/21/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8072
Most Recent Contact: 01/24/2022

VAPOR REOPENED - NY: Vapor Intrusion Legacy Site List

Agency Version Date: 01/26/2022
Agency Update Frequency: Quarterly
Planned Next Contact: 07/20/2022
Agency: NY State Department of Environmental Conservation
Agency Contact: (518) 402-9543
Most Recent Contact: 04/22/2022

STATE RECORDS

HIST SPDES - NY: List of sites with SPDES Permits that is no longer in current agency list.

Agency Version Date: 02/04/2019
Agency Update Frequency: Annually
Planned Next Contact: 04/27/2022
Agency: Department of Environmental Conservation
Agency Contact: (518) 402-8210
Most Recent Contact: 01/31/2022

SUBJECT PROPERTY ADDRESS:

5447.0
1035 Dug Hill Rd
West Hurley, NY 12491

SUBJECT PROPERTY COORDINATES:

Latitude(North):	41.965644 - 41°57'56.3"
Longitude(West):	-74.109367 - -74°6'33.7"
Universal Transverse Mercator:	Zone 18N
UTM X (Meters):	573800.13
UTM Y (Meters):	4646345.27

ELEVATION:

Elevation:	653 ft. above sea level

USGS TOPOGRAPHIC MAP:

Subject Property Map:	41074-H1 Kingston West, NY
Most Recent Revision:	2019

GEOHYDROLOGY DATA:

SUBJECT PROPERTY TOPOGRAPHY:

Topographic Gradient: North

DFIRM FLOOD ZONE:

	DFIRM Flood
Subject Property County:	Electronic Data:
ULSTER	Yes - refer to the PROPERTY PROXIMITY MAP and AREA MAP
Flood Plain Panel at Subject Property:	36111C0455F (Eff. date 11/18/2016)
Additional Panels in search area:	36111C0435F (Eff. date 11/18/2016)

FEMA FLOOD ZONE:

	FEMA Flood
Subject Property County:	Electronic Data:
ULSTER	Yes - refer to the PROPERTY PROXIMITY MAP and AREA MAP
Flood Plain Panel at Subject Property:	3608570007C
Additional Panels in search area:	No available data

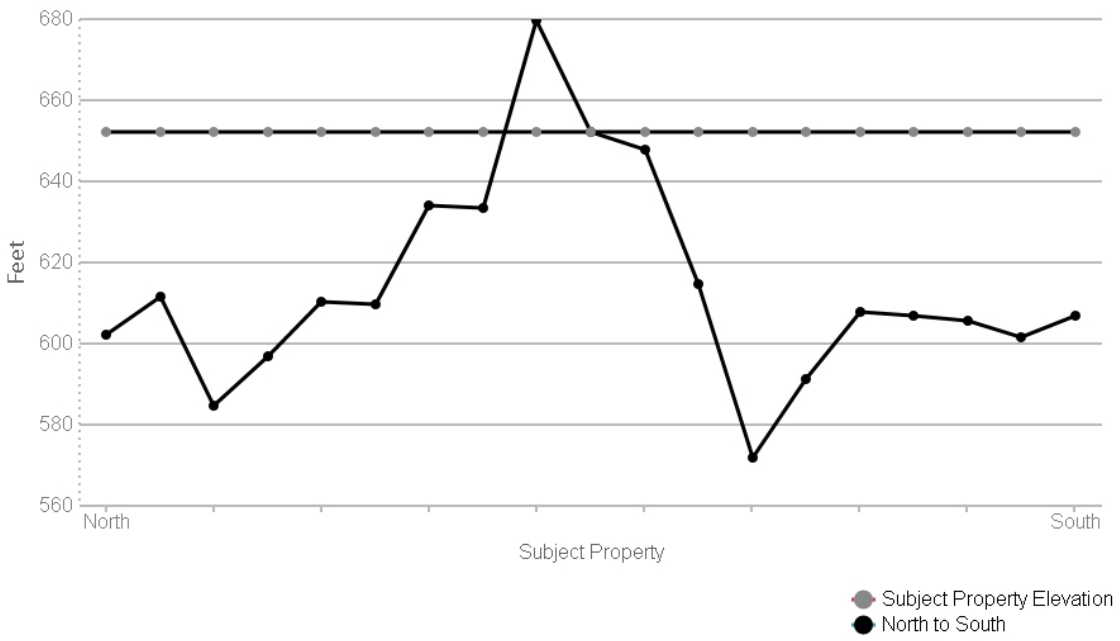
NATIONAL WETLAND INVENTORY:

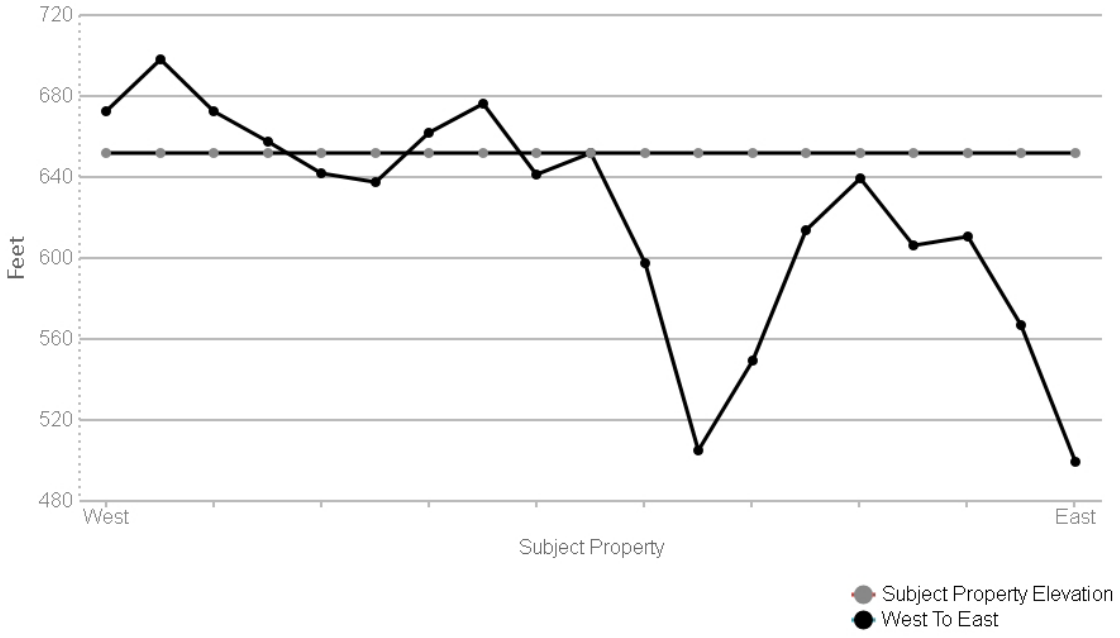
	NWI Electronic
NWI Quad at Subject Property:	Data Coverage:
Kingston West	Yes - refer to the Geological Findings Map

LITHOSTRATIGRAPHIC INFORMATION:

ROCK STRATIGRAPHIC UNIT:		GEOLOGIC AGE IDENTIFICATION
Era:	Paleozoic	Category: 108 D2c Middle Devonian continental
System:	Devonian	
Series:	Middle Devonian continental	
Code:	D2c	

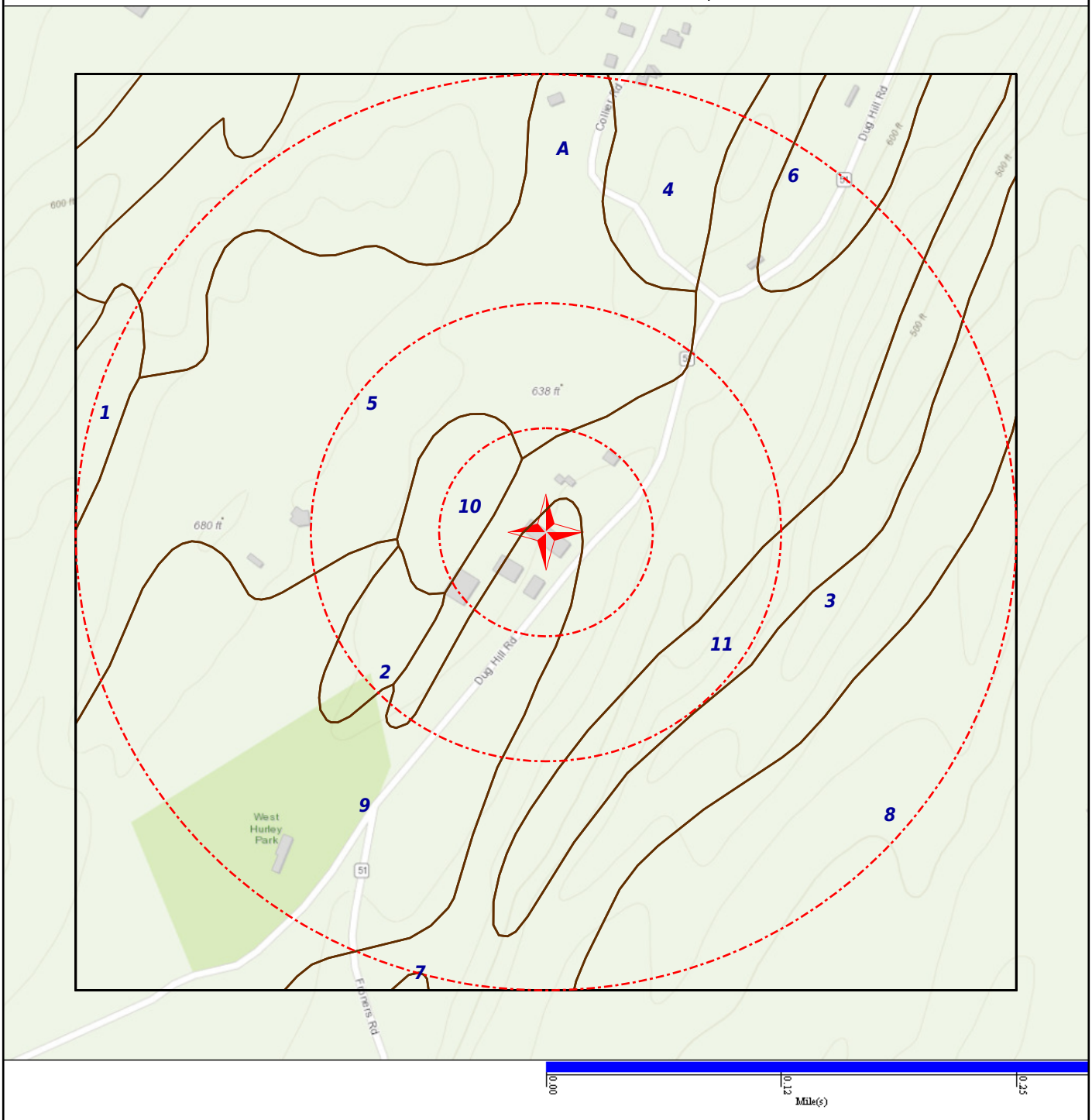
SURROUNDING ELEVATION PROFILES:





SUBJECT NAME: 5447.0
ADDRESS: 1035 Dug Hill Rd, West Hurley, NY, 12491
LAT/LONG: 41.965644 / -74.109367

PREPARED FOR: Crawford & Associates Engineering & La...
ORDER #: 70993
REPORT DATE: April 25, 2022



SOIL COMPOSITION IN GENERAL AREA OF SUBJECT PROPERTY:

Agency source: Soil Conservation Service, US Department of Agriculture

SOIL MAP ID 1	SSURGO
USDA Soil Name	Arnot,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	D
Soil Drainage Class	Somewhat excessively drained
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Moderate

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-11	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
3	11-46	Silt loam	Granular materials (35% or less passing No. 200), silty or clayey gravel and sand. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials,	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and	4-14	3.6-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
3	11-46	Silt loam	1984.	on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
4	46-56		No data	No data	0-0.01	0-0

SOIL MAP ID 2 **SSURGO**

USDA Soil Name	Morris,Series
USDA Soil Texture	Silt loam
Hydrologic Soil Group	D
Soil Drainage Class	Somewhat poorly drained
Hydric Classification	20
Corrosion Potential - Uncoated Steel	High

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-10	Silt loam	Silt-Clay Materials (more than 35% passing No. 200), clayey soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Organic Clay or Organic Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	1-99.9999	4.5-6
2	10-31	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size	1-99.9999	4.5-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
2	10-31	Silt loam	of State Highway and Transportation Officials, 1984.	distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	1-99.9999	4.5-6
3	31-41	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	1-99.9999	4.5-6
4	41-152	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	0.01-0.9999	5.1-6.5
5	152-183	Loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	0.01-0.9999	5.1-6.5

SOIL MAP ID 3	SSURGO
USDA Soil Name	Arnot,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	D
Soil Drainage Class	Somewhat excessively drained
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Moderate

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-11	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
3	11-46	Silt loam	Granular materials (35% or less passing No. 200), silty or clayey gravel and sand. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM,	4-14	3.6-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
3	11-46	Silt loam	Granular materials (35% or less passing No. 200), silty or clayey gravel and sand. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	1984).	4-14	3.6-6
4	46-56		No data	No data	0-0.01	0-0

SOIL MAP ID 4 **SSURGO**

USDA Soil Name	Lordstown,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	C
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size	4-14	4.5-6.5

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
2	3-13	Silt loam	of State Highway and Transportation Officials, 1984.	distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6.5
3	13-84	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6
4	84-94		No data	No data	0-0.01	0-0

SOIL MAP ID 5	SSURGO
USDA Soil Name	Quarry,Miscellaneous area
USDA Soil Texture	Not Reported
Hydrologic Soil Group	Not Reported
Soil Drainage Class	Not Reported
Hydric Classification	5
Corrosion Potential - Uncoated Steel	Not Reported

SOIL MAP ID 6	SSURGO
USDA Soil Name	Lordstown,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	C
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6.5
3	13-84	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6
4	84-94		No data	No data	0-0.01	0-0

SOIL MAP ID 7	SSURGO
USDA Soil Name	Lordstown,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	C
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6.5
3	13-84	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
4	84-94		No data	No data	0-0.01	0-0

SOIL MAP ID 8 **SSURGO**

USDA Soil Name	Lordstown,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	C
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6.5
3	13-84	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent	4-14	4.5-6

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
3	13-84	Silt loam	M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6
4	84-94		No data	No data	0-0.01	0-0

SOIL MAP ID 9 **SSURGO**

USDA Soil Name	Lordstown,Series
USDA Soil Texture	Not Reported
Hydrologic Soil Group	C
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-3		Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	Highly organic soils, Peat. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	3.6-6
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM,	4-14	4.5-6.5

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
2	3-13	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	1984).	4-14	4.5-6.5
3	13-84	Silt loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays, (liquid limit is less than 50%), Silt. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	4-14	4.5-6
4	84-94		No data	No data	0-0.01	0-0

SOIL MAP ID 10	SSURGO
USDA Soil Name	Udorthents,Taxon above family
USDA Soil Texture	Loam
Hydrologic Soil Group	B
Soil Drainage Class	Somewhat excessively drained
Hydric Classification	5
Corrosion Potential - Uncoated Steel	Moderate

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-10	Loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	COARSE-GRAINED SOILS, Gravels, gravel with fines, Clayey Gravel. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	0.42-141	4.5-7.3
2	10-178	Sandy loam	Silt-Clay materials (more than 35% passing NO. 200), silty soils. Reference: This is a classification of soil material for highway and airfield construction (Procedure M 145-73 in Am. Assoc. of State Highway and Transportation Officials, 1984.	FINE-GRAINED SOILS, Silts and clays (liquid limit is less than 50%), Lean Clay. Reference: This is a classification of soil material designed for general construction purposes. It is dependent on the particle size distribution of the <75 mm, the liquid limit, and the plasticity index and on whether the soil material is high in organic matter (ASTM test D 2487, in ASTM, 1984).	0.42-42	4.5-8.4

SOIL MAP ID 11	**SSURGO**
USDA Soil Name	Rock outcrop, Miscellaneous area
USDA Soil Texture	Not Reported
Hydrologic Soil Group	Not Reported
Soil Drainage Class	Not Reported
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Not Reported

SOIL MAP ID A	STATSGO
USDA Soil Name	Arnot,Series
USDA Soil Texture	Silt loam
Hydrologic Soil Group	C/D
Soil Drainage Class	Somewhat excessively drained
Hydric Classification	0
Corrosion Potential - Uncoated Steel	Low

Layer	Depth (inches)	Soil Texture	AASHTO Group	Unified Soil Description	Saturated Hydraulic Conductivity micro m/sec	Soil Reaction pH
1	0-6	Silt loam	No data	No data	4.2343-14.1143	3.6-6
2	6-17	No data	No data	No data	4.2343-14.1143	3.6-6
3	17-21		No data	No data	1.4114-14.1143	No data

WATER AGENCY DATA:

WATER AGENCY SEARCH DISTANCES:

DATABASE:	SEARCH DISTANCE (MILES):
NWIS	1.000
OIL & GAS WELLS - NY	1.000
PWS	1.000
WELLS - NY	1.000

DISTANCE TO NEAREST:	DISTANCE:
NWIS	0.793 mi / 4186 ft
OIL & GAS WELLS - NY	N/A
PWS	0.329 mi / 1737 ft
WELLS - NY	0.300 mi / 1584 ft

FEDERAL WATER AGENCY DATA SUMMARY:

MAP ID:	WELL ID:	LOCATION FROM SP:
2	NY5530086	1/4 - 1/2 Mile N
16	NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION	1/2 - 1 Mile WNW
A18	415820074055001	1/2 - 1 Mile ENE

Note: PWS System location is not always the same as well location.

STATE/LOCAL WATER AGENCY DATA SUMMARY:

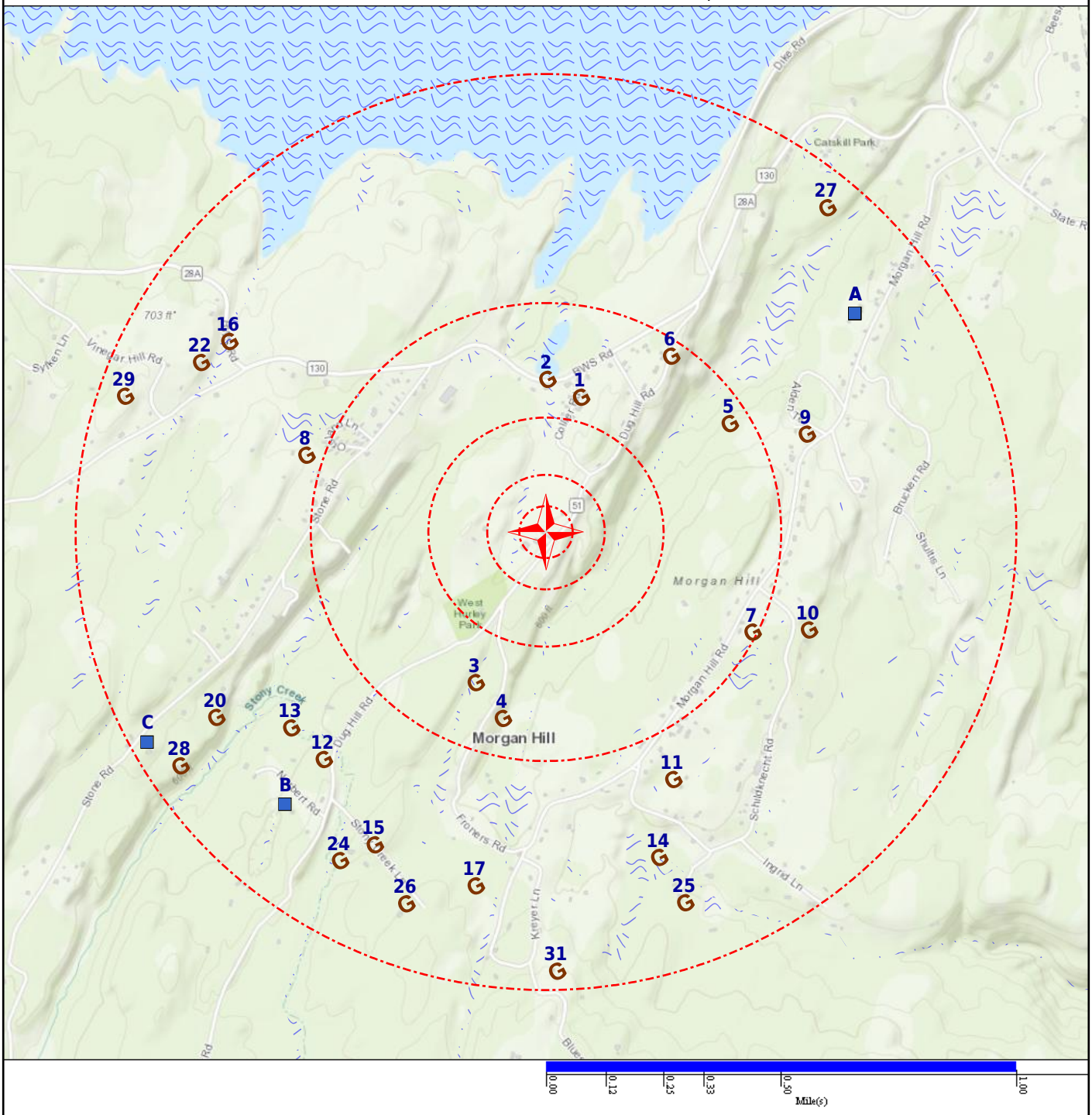
MAP ID:	WELL ID:	LOCATION FROM SP:
1	U5778	1/4 - 1/2 Mile NNE
3	U2478	1/4 - 1/2 Mile SSW
4	U5262	1/4 - 1/2 Mile SSW
5	U9868	1/4 - 1/2 Mile ENE
6	U8330	1/4 - 1/2 Mile NE
7	U5181	1/4 - 1/2 Mile ESE

STATE/LOCAL WATER AGENCY DATA SUMMARY: *(cont.)*

MAP ID:	WELL ID:	LOCATION FROM SP:
8	U4604	1/2 - 1 Mile WNW
9	U8263	1/2 - 1 Mile ENE
10	U5061	1/2 - 1 Mile ESE
11	U2477	1/2 - 1 Mile SSE
12	U4144	1/2 - 1 Mile SW
13	U8348	1/2 - 1 Mile WSW
14	U2330	1/2 - 1 Mile SSE
15	U5970	1/2 - 1 Mile SW
17	U4073	1/2 - 1 Mile SSW
B19	U1971	1/2 - 1 Mile SW
20	U9400	1/2 - 1 Mile WSW
B21	U2746	1/2 - 1 Mile SW
22	U7385	1/2 - 1 Mile WNW
A23	U4034	1/2 - 1 Mile ENE
24	U7652	1/2 - 1 Mile SW
25	U2162	1/2 - 1 Mile SSE
26	U5017	1/2 - 1 Mile SSW
27	U4207	1/2 - 1 Mile NE
28	U7171	1/2 - 1 Mile WSW
29	U5838	1/2 - 1 Mile WNW
C30	U5203	1/2 - 1 Mile WSW
31	U4655	1/2 - 1 Mile S
C32	U5202	1/2 - 1 Mile WSW

SUBJECT NAME: 5447.0
ADDRESS: 1035 Dug Hill Rd, West Hurley, NY, 12491
LAT/LONG: 41.965644 / -74.109367

PREPARED FOR: Crawford & Associates Engineering & La...
ORDER #: 70993
REPORT DATE: April 25, 2022



Map Id: 1
Direction: NNE
Distance: 0.300 mi., 1585 ft.
Elevation: 627 ft.
Relative: Lower

Site Name : U5778
41.969861, -74.107972
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7167079
EPA ID: N/R

WELLS - NY

Report Date :	2008-01-15
Well Number :	U5778
Well Location :	60 COLLIER RD, WEST HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2007-12-10
Driller Completion Date :	2007-12-11
Method :	GPS
Well Depth (Feet) :	167
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	30
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	N/R
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 2
Direction: N
Distance: 0.329 mi., 1737 ft.
Elevation: 610 ft.
Relative: Lower

Site Name : NY5530086
689 RT 28A
WEST HURLEY, NY 12491

Database(s) : [PWS]

Envirosite ID: 5139131
EPA ID: N/R

PWS

Facility Address :	689 RT 28A, WEST HURLEY, NY 12491
PWS ID :	NY5530086
PWS Type :	Transient non-community system
PWS Name :	DUCK POND DELI
Activity Status :	Inactive
Primary Source :	Ground water
Submission Year :	2021
Submission Year Quarter :	2021Q4
Population Served Count :	25
Service Connections Count :	1
Population Category 2 :	<10,000
Population Category 3 :	<=3300
Population Category 4 :	<10K
Population Category 5 :	<=500
Population Category 11 :	<=100
Submission Quarter :	4
Submission Status Code :	Y

Map Id: 2
Direction: N
Distance: 0.329 mi., 1737 ft.
Elevation: 610 ft.
Relative: Lower

Site Name : NY5530086
689 RT 28A
WEST HURLEY, NY 12491

Database(s) : [PWS] ***(cont.)***

Envirosite ID: 5139131
EPA ID: N/R

PWS ***(cont.)***

First Reported Date :	2000-06-30
Last Reported Date :	2020-03-18
Deactivation Date :	2000-05-11
GW or SW :	Groundwater
Is Grant Eligible :	N
Is Outstanding Performer :	N/R
Is School or Daycare :	N
Is Source Water Protected :	N
Primacy Agency :	New York
Primacy Type :	State
Org Name :	N/R
EPA Region :	Region 2
Admin Name :	DUCK POND DELI OF ULSTER CO INC
Owner Type :	Private
Phone Number :	N/R
Phone Ext Number :	N/R
Alt Phone Number :	N/R
Email Address :	N/R
Fax Number :	N/R
Is Wholesaler :	N
LT2 Schedule Category :	N/R
NPM Candidate :	N
CDS ID :	N/R
DBPR Schedule Category :	N/R
Outstanding Performer Date :	N/R
Season Begin Date :	01-01
Season End Date :	12-31
Source Water Protection Date :	N/R
Seasonal Startup System :	N/R
Reduced Monitoring Begin Date :	N/R
Reduced Monitoring End Date :	N/R
Reduced RTCR Monitoring :	N/R
Last Date in Agency List :	2022-02-03

Map Id: 3
Direction: SSW
Distance: 0.366 mi., 1931 ft.
Elevation: 621 ft.
Relative: Lower

Site Name : U2478
41.960833, -74.112333
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163704
EPA ID: N/R

WELLS - NY

Report Date :	2002-07-12
Well Number :	U2478
Well Location :	N/R
Town :	N/A
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2002-07-10
Driller Completion Date :	2002-07-10
Method :	GPS

Map Id: 3
Direction: SSW
Distance: 0.366 mi., 1931 ft.
Elevation: 621 ft.
Relative: Lower

Site Name : U2478
41.960833, -74.112333
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7163704
EPA ID: N/R

WELLS - NY ***(cont.)***

Well Depth (Feet) :	497
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	100
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	30
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	2
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 4
Direction: SSW
Distance: 0.424 mi., 2238 ft.
Elevation: 603 ft.
Relative: Lower

Site Name : U5262
41.959667, -74.111222
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166510
EPA ID: N/R

WELLS - NY

Report Date :	2006-10-19
Well Number :	U5262
Well Location :	(FROMERS RD, HURLEY, NY)
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2006-10-17
Driller Completion Date :	2006-10-18
Method :	GPS
Well Depth (Feet) :	123
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	25
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 5
Direction: ENE
Distance: 0.450 mi., 2376 ft.
Elevation: 527 ft.
Relative: Lower

Site Name : U9868
41.969, -74.101861
NY

Database(s) : [WELLS - NY]

Envirosite ID: 44663822
EPA ID: N/R

WELLS - NY

Report Date :	2021-01-15
Well Number :	U9868
Well Location :	234 MORGAN HILL, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2020-09-03
Driller Completion Date :	2020-09-03
Method :	N/R
Well Depth (Feet) :	500
Depth to Bedrock (Feet) :	0
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	19
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	3
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 6
Direction: NE
Distance: 0.461 mi., 2434 ft.
Elevation: 626 ft.
Relative: Lower

Site Name : U8330
41.971139, -74.104278
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7168827
EPA ID: N/R

WELLS - NY

Report Date :	2014-11-21
Well Number :	U8330
Well Location :	1140 DUG HILL RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2014-11-20
Driller Completion Date :	2014-11-20
Method :	GPS
Well Depth (Feet) :	223
Depth to Bedrock (Feet) :	25
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	40
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 6
Direction: NE
Distance: 0.461 mi., 2434 ft.
Elevation: 626 ft.
Relative: Lower

Site Name : U8330
41.971139, -74.104278
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7168827
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	20
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 7
Direction: ESE
Distance: 0.488 mi., 2577 ft.
Elevation: 612 ft.
Relative: Lower

Site Name : U5181
41.962417, -74.100917
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166428
EPA ID: N/R

WELLS - NY

Report Date :	2006-08-29
Well Number :	U5181
Well Location :	12 SCHILDKNECHT RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10273
Driller Start Date :	2006-09-26
Driller Completion Date :	2006-10-02
Method :	EST
Well Depth (Feet) :	150
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	N/R
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	Y
Screen Length (Feet) :	10
Yield Test Average Discharge (Gallons per Minute):	N/R
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 8
Direction: WNW
Distance: 0.537 mi., 2837 ft.
Elevation: 681 ft.
Relative: Higher

Site Name : U4604
41.968, -74.119333
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165856
EPA ID: N/R

WELLS - NY

Report Date :	2005-11-02
Well Number :	U4604
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2005-11-01
Driller Completion Date :	2005-11-01
Method :	GPS
Well Depth (Feet) :	97
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	15
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 9
Direction: ENE
Distance: 0.587 mi., 3098 ft.
Elevation: 560 ft.
Relative: Lower

Site Name : U8263
41.968667, -74.098694
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7168755
EPA ID: N/R

WELLS - NY

Report Date :	2014-09-08
Well Number :	U8263
Well Location :	MORGAN HILL RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2014-09-04
Driller Completion Date :	2014-09-05
Method :	GPS
Well Depth (Feet) :	448
Depth to Bedrock (Feet) :	0
Depth to Groundwater (Feet) :	50
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 9
Direction: ENE
Distance: 0.587 mi., 3098 ft.
Elevation: 560 ft.
Relative: Lower

Site Name : U8263
41.968667, -74.098694
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7168755
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	1
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 10
Direction: ESE
Distance: 0.597 mi., 3153 ft.
Elevation: 607 ft.
Relative: Lower

Site Name : U5061
41.962472, -74.098556
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166312
EPA ID: N/R

WELLS - NY

Report Date :	2006-06-20
Well Number :	U5061
Well Location :	39 SCHILDKNECHT RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10273
Driller Start Date :	2006-06-26
Driller Completion Date :	2006-07-11
Method :	N/R
Well Depth (Feet) :	105
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	10
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	N/R
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 11
Direction: SSE
Distance: 0.606 mi., 3198 ft.
Elevation: 606 ft.
Relative: Lower

Site Name : U2477
41.957778, -74.104167
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163703
EPA ID: N/R

WELLS - NY

Report Date :	2002-07-30
Well Number :	U2477
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2002-07-25
Driller Completion Date :	2002-07-25
Method :	N/R
Well Depth (Feet) :	87
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	20
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	30
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 12
Direction: SW
Distance: 0.692 mi., 3654 ft.
Elevation: 617 ft.
Relative: Lower

Site Name : U4144
41.958361, -74.118611
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165423
EPA ID: N/R

WELLS - NY

Report Date :	2005-03-16
Well Number :	U4144
Well Location :	787 DUG HILL RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10273
Driller Start Date :	2005-03-14
Driller Completion Date :	2005-03-18
Method :	N/R
Well Depth (Feet) :	150
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	10
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 12
Direction: SW
Distance: 0.692 mi., 3654 ft.
Elevation: 617 ft.
Relative: Lower

Site Name : U4144
41.958361, -74.118611
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7165423
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	N/R
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 13
Direction: WSW
Distance: 0.694 mi., 3667 ft.
Elevation: 577 ft.
Relative: Lower

Site Name : U8348
41.959389, -74.119944
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7168851
EPA ID: N/R

WELLS - NY

Report Date :	2014-12-02
Well Number :	U8348
Well Location :	795 DUG HILL RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2014-12-01
Driller Completion Date :	2014-12-01
Method :	GPS
Well Depth (Feet) :	73
Depth to Bedrock (Feet) :	4
Depth to Groundwater (Feet) :	0
Cased Depth (Feet) :	19
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	90
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 14
Direction: SSE
Distance: 0.755 mi., 3986 ft.
Elevation: 568 ft.
Relative: Lower

Site Name : U2330
41.955278, -74.104722
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163553
EPA ID: N/R

WELLS - NY

Report Date :	2002-03-18
Well Number :	U2330
Well Location :	SCHILDKNECT RD
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2002-03-13
Driller Completion Date :	2002-03-13
Method :	N/R
Well Depth (Feet) :	147
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	40
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	40
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	12
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 15
Direction: SW
Distance: 0.778 mi., 4110 ft.
Elevation: 639 ft.
Relative: Lower

Site Name : U5970
41.955694, -74.116472
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7167299
EPA ID: N/R

WELLS - NY

Report Date :	2008-08-01
Well Number :	U5970
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10121
Driller Start Date :	2008-07-28
Driller Completion Date :	2008-07-28
Method :	GPS
Well Depth (Feet) :	165
Depth to Bedrock (Feet) :	3
Depth to Groundwater (Feet) :	2
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	21
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 15
Direction: SW
Distance: 0.778 mi., 4110 ft.
Elevation: 639 ft.
Relative: Lower

Site Name : U5970
41.955694, -74.116472
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7167299
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	50
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF]

Envirosite ID: 5037429
EPA ID: N/R

PWS

Facility Address :	906 RT 28 PO BOX 327, WEST HURLEY, NY 12491
PWS ID :	NY5530117
PWS Type :	Transient non-community system
PWS Name :	LA BELLA PASTA
Activity Status :	Active
Primary Source :	Ground water
Submission Year :	2021
Submission Year Quarter :	2021Q4
Population Served Count :	25
Service Connections Count :	1
Population Category 2 :	<10,000
Population Category 3 :	<=3300
Population Category 4 :	<10K
Population Category 5 :	<=500
Population Category 11 :	<=100
Submission Quarter :	4
Submission Status Code :	Y
First Reported Date :	2000-06-30
Last Reported Date :	2022-01-01
Deactivation Date :	N/R
GW or SW :	Groundwater
Is Grant Eligible :	Y
Is Outstanding Performer :	N/R
Is School or Daycare :	N
Is Source Water Protected :	N
Primacy Agency :	New York
Primacy Type :	State
Org Name :	LA BELLA PASTA INC
EPA Region :	Region 2
Admin Name :	LA BELLA PASTA INC
Owner Type :	Private
Phone Number :	845-331-9130
Phone Ext Number :	N/R
Alt Phone Number :	N/R
Email Address :	N/R

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF] ***(cont.)***

Envirosite ID: 5037429
EPA ID: N/R

PWS ***(cont.)***

Fax Number :	N/R
Is Wholesaler :	N
LT2 Schedule Category :	N/R
NPM Candidate :	Y
CDS ID :	N/R
DBPR Schedule Category :	N/R
Outstanding Performer Date :	N/R
Season Begin Date :	01-01
Season End Date :	12-31
Source Water Protection Date :	N/R
Seasonal Startup System :	N/R
Reduced Monitoring Begin Date :	N/R
Reduced Monitoring End Date :	N/R
Reduced RTCR Monitoring :	N/R
Last Date in Agency List :	2022-02-03

PWS ENF

Facility Address :	906 RT 28 PO BOX 327, WEST HURLEY, NY 12491

Site Details

PWS ID :	NY5530117
PWS Name :	LA BELLA PASTA
EPA Region :	Region 2
Primacy Agency :	New York
PWS Type :	Transient non-community system
Primacy Type :	State
Primary Source :	Ground water
Activity Status :	Active
Deactivation Date :	N/R
Owner Type :	Private
Phone Number :	845-331-9130
Last Date in Agency List :	2022-03-28

Violation Details

Details for this site have been truncated due to the large number of available details for this site within this dataset. For the complete details for this site, contact your Envirosite account representative for a complimentary site report containing all of the details available.

RTC Enforcement ID :	1004
Violation ID :	604
Submission Year :	2021
Violation First Reported Date :	2004-05-01
Contaminant Name :	Nitrate
Rule Family :	Inorganic Chemicals
Rule Group :	Chemicals
Rule Name :	Nitrates
Violation Type :	Monitoring, Regular
Is Health Based :	N
Is Major Violation :	Y
Severity Indicator Count :	N/R

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF] ***(cont.)***

Envirosite ID: 5037429
EPA ID: N/R

PWS ENF ***(cont.)***

Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2004-02-18
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	1406
Violation ID :	706
Submission Year :	2021
Violation First Reported Date :	2006-02-27
Contaminant Name :	Nitrate
Rule Family :	Inorganic Chemicals
Rule Group :	Chemicals
Rule Name :	Nitrates
Violation Type :	Monitoring, Regular
Is Health Based :	N
Is Major Violation :	Y
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2006-02-13
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	1608
Violation ID :	808
Submission Year :	2021
Violation First Reported Date :	2008-02-20
Contaminant Name :	N/R
Rule Family :	Miscellaneous
Rule Group :	Other
Rule Name :	Miscellaneous
Violation Type :	Operations Report
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2008-03-03
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2109
Violation ID :	1009

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF] ***(cont.)***

Envirosite ID: 5037429
EPA ID: N/R

PWS ENF ***(cont.)***

Submission Year :	2021
Violation First Reported Date :	2009-02-17
Contaminant Name :	Nitrate
Rule Family :	Inorganic Chemicals
Rule Group :	Chemicals
Rule Name :	Nitrates
Violation Type :	Monitoring, Regular
Is Health Based :	N
Is Major Violation :	Y
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2009-03-09
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2109
Violation ID :	908
Submission Year :	2021
Violation First Reported Date :	2008-08-14
Contaminant Name :	Coliform (TCR)
Rule Family :	Total Coliform Rules
Rule Group :	Microbials
Rule Name :	Total Coliform Rule
Violation Type :	Monitoring, Routine Major (TCR)
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2009-03-09
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2113
Violation ID :	504
Submission Year :	2021
Violation First Reported Date :	2004-05-01
Contaminant Name :	Coliform (TCR)
Rule Family :	Total Coliform Rules
Rule Group :	Microbials
Rule Name :	Total Coliform Rule
Violation Type :	Monitoring, Routine Major (TCR)
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF] ***(cont.)***

Envirosite ID: 5037429
EPA ID: N/R

PWS ENF ***(cont.)***

Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2003-12-31
Enforcement Action Description :	State Public Notification requested
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2114
Violation ID :	1011
Submission Year :	2021
Violation First Reported Date :	2012-08-02
Contaminant Name :	N/R
Rule Family :	Miscellaneous
Rule Group :	Other
Rule Name :	Miscellaneous
Violation Type :	Operations Report
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2010-07-13
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2114
Violation ID :	1010
Submission Year :	2021
Violation First Reported Date :	2012-08-02
Contaminant Name :	N/R
Rule Family :	Miscellaneous
Rule Group :	Other
Rule Name :	Miscellaneous
Violation Type :	Operations Report
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2010-07-13
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2116
Violation ID :	1012
Submission Year :	2021
Violation First Reported Date :	2012-08-02

Map Id: 16
Direction: WNW
Distance: 0.792 mi., 4183 ft.
Elevation: 659 ft.
Relative: Higher

Site Name : NY5530117 | LA BELLA PASTA-ULTRAVIOLET DISINFECTION
906 RT 28 PO BOX 327
WEST HURLEY, NY 12491

Database(s) : [PWS, PWS ENF] ***(cont.)***

Envirosite ID: 5037429
EPA ID: N/R

PWS ENF ***(cont.)***

Contaminant Name :	N/R
Rule Family :	Miscellaneous
Rule Group :	Other
Rule Name :	Miscellaneous
Violation Type :	Operations Report
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2011-02-10
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

RTC Enforcement ID :	2119
Violation ID :	1013
Submission Year :	2021
Violation First Reported Date :	2012-08-02
Contaminant Name :	N/R
Rule Family :	Miscellaneous
Rule Group :	Other
Rule Name :	Miscellaneous
Violation Type :	Operations Report
Is Health Based :	N
Is Major Violation :	N/R
Severity Indicator Count :	N/R
Public Notification Tier :	3
Address Line 1 :	906 RT 28, WEST HURLEY, 12491
Address Line 2 :	PO BOX 327
Compliance Status :	Returned to Compliance
RTC Date :	2011-06-21
Enforcement Action Description :	State Compliance achieved
Admin Name :	LA BELLA PASTA INC
Email Address :	N/R

Map Id: 17
Direction: SSW
Distance: 0.792 mi., 4184 ft.
Elevation: 617 ft.
Relative: Lower

Site Name : U4073
41.954389, -74.112333
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165351
EPA ID: N/R

WELLS - NY

Report Date :	2005-03-07
Well Number :	U4073
Well Location :	N/R

Map Id: 17
Direction: SSW
Distance: 0.792 mi., 4184 ft.
Elevation: 617 ft.
Relative: Lower

Site Name : U4073
41.954389, -74.112333
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7165351
EPA ID: N/R

WELLS - NY ***(cont.)***

Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10121
Driller Start Date :	2005-01-31
Driller Completion Date :	2005-01-31
Method :	GPS
Well Depth (Feet) :	225
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	40
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	21
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	7
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: A18
Direction: ENE
Distance: 0.793 mi., 4187 ft.
Elevation: 492 ft.
Relative: Lower

Site Name : 415820074055001
41.972314, -74.096808
NY

Database(s) : [NWIS]

Envirosite ID: 7854621
EPA ID: N/R

NWIS

Site Identification Number :	415820074055001
Site Type :	Well
Station Name :	U1319
Agency :	U.S. Geological Survey
District :	N/R
State :	NY
County :	Ulster County
Country :	USA
Land Net Location :	N/R
Name of Location Map :	KINGSTON WEST, NY
Scale of Location Map :	24000
Altitude of Gage/Land Surface :	490
Method Altitude Determined :	Interpolated from topographic map.
Altitude Accuracy :	1
Altitude Datum :	National Geodetic Vertical Datum of 1929
Hydrologic Unit :	Middle Hudson
Drainage Basin :	N/R
Topographic Setting :	Hillside
Flags for the Type of Data Collected:	NNNNNNNNNNNNNNNNNNNNNNNNNNNNN
Flags for Instruments at Site :	NNNNNNNNNNNNNNNNNNNNNNNNNNNNN
Date of First Construction :	N/R
Date Site Established or Inventoried:	N/R

Map Id: A18
Direction: ENE
Distance: 0.793 mi., 4187 ft.
Elevation: 492 ft.
Relative: Lower

Site Name : 415820074055001
41.972314, -74.096808
NY

Database(s) : [NWIS] ***(cont.)***

Envirosite ID: 7854621
EPA ID: N/R

NWIS ***(cont.)***

Drainage Area :	N/R
Contributing Drainage Area :	N/R
Data Reliability :	Unchecked data.
Data-Other GW Files :	NYNNNNNN
National Aquifer :	N/R
Local Aquifer :	Paleozoic Erathem
Local Aquifer Type :	N/R
Well Depth :	65.0
Hole Depth :	N/R
Source of Depth Data :	N/R
Project Number :	BULL65
Real-Time Data Flag :	N/R
Peak-Streamflow Data Begin Date :	N/R
Peak-Streamflow Data End Date :	N/R
Peak-Streamflow Data Count :	N/R
Water-Quality Data Begin Date :	N/R
Water-Quality Data End Date :	N/R
Water-Quality Data Count :	N/R
Field Water-Level Measurements Begin Date:	N/R
Field Water-level Measurements End Date:	N/R
Field Water-Level Measurements Count:	N/R
Site-Visit Data Begin Date :	N/R
Site-Visit Data End Date :	N/R
Site-Visit Data Count :	N/R
Latitude :	41.972314
Longitude :	-74.096808
Last Date in Agency List :	2022-03-04

Map Id: B19
Direction: SW
Distance: 0.806 mi., 4257 ft.
Elevation: 597 ft.
Relative: Lower

Site Name : U1971
41.957278, -74.120306
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163178
EPA ID: N/R

WELLS - NY

Report Date :	2001-05-01
Well Number :	U1971
Well Location :	LOT3, NORBERT RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10054
Driller Start Date :	2001-05-02
Driller Completion Date :	2001-05-02
Method :	EST
Well Depth (Feet) :	160
Depth to Bedrock (Feet) :	3
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R

Map Id: B19
Direction: SW
Distance: 0.806 mi., 4257 ft.
Elevation: 597 ft.
Relative: Lower

Site Name : U1971
41.957278, -74.120306
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7163178
EPA ID: N/R

WELLS - NY ***(cont.)***

Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	20
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 20
Direction: WSW
Distance: 0.811 mi., 4284 ft.
Elevation: 634 ft.
Relative: Lower

Site Name : U9400
41.959722, -74.123
NY

Database(s) : [WELLS - NY]

Envirosite ID: 40552075
EPA ID: N/R

WELLS - NY

Report Date :	2019-03-18
Well Number :	U9400
Well Location :	189 STONE RD, WEST HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10118
Driller Start Date :	2019-03-18
Driller Completion Date :	2019-03-18
Method :	GPS
Well Depth (Feet) :	265
Depth to Bedrock (Feet) :	3
Depth to Groundwater (Feet) :	80
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	40
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	4
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: B21
Direction: SW
Distance: 0.818 mi., 4319 ft.
Elevation: 614 ft.
Relative: Lower

Site Name : U2746
41.956833, -74.12
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163980
EPA ID: N/R

WELLS - NY

Report Date :	2003-04-16
Well Number :	U2746
Well Location :	N/R
Town :	N/A
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2003-02-27
Driller Completion Date :	2003-02-27
Method :	GPS
Well Depth (Feet) :	135
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	10
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	50
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 22
Direction: WNW
Distance: 0.821 mi., 4335 ft.
Elevation: 696 ft.
Relative: Higher

Site Name : U7385
41.970944, -74.123667
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7167791
EPA ID: N/R

WELLS - NY

Report Date :	2010-03-23
Well Number :	U7385
Well Location :	8 SPILLWAY RD, SHOKAN, NY 12491
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10828
Driller Start Date :	2010-02-23
Driller Completion Date :	2010-03-15
Method :	N/R
Well Depth (Feet) :	165
Depth to Bedrock (Feet) :	0
Depth to Groundwater (Feet) :	40
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 22
Direction: WNW
Distance: 0.821 mi., 4335 ft.
Elevation: 696 ft.
Relative: Higher

Site Name : U7385
41.970944, -74.123667
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7167791
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	7
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: A23
Direction: ENE
Distance: 0.834 mi., 4402 ft.
Elevation: 495 ft.
Relative: Lower

Site Name : U4034
41.972833, -74.096333
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165312
EPA ID: N/R

WELLS - NY

Report Date :	2004-12-24
Well Number :	U4034
Well Location :	104 MORGAN HILL RD, HURLEY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2004-12-23
Driller Completion Date :	2004-12-23
Method :	GPS
Well Depth (Feet) :	198
Depth to Bedrock (Feet) :	4
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	20
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	8
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 24
Direction: SW
Distance: 0.845 mi., 4463 ft.
Elevation: 625 ft.
Relative: Lower

Site Name : U7652
41.955194, -74.117917
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7168091
EPA ID: N/R

WELLS - NY

Report Date :	2011-08-01
Well Number :	U7652
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10121
Driller Start Date :	2011-07-13
Driller Completion Date :	2011-07-13
Method :	GPS
Well Depth (Feet) :	165
Depth to Bedrock (Feet) :	4
Depth to Groundwater (Feet) :	20
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	40
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	50
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 25
Direction: SSE
Distance: 0.867 mi., 4578 ft.
Elevation: 559 ft.
Relative: Lower

Site Name : U2162
41.953833, -74.103667
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7163380
EPA ID: N/R

WELLS - NY

Report Date :	2001-10-18
Well Number :	U2162
Well Location :	MORGAN HILL
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2001-10-11
Driller Completion Date :	2001-10-11
Method :	GPS
Well Depth (Feet) :	187
Depth to Bedrock (Feet) :	10
Depth to Groundwater (Feet) :	30
Cased Depth (Feet) :	18
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 25
Direction: SSE
Distance: 0.867 mi., 4578 ft.
Elevation: 559 ft.
Relative: Lower

Site Name : U2162
41.953833, -74.103667
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7163380
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	8
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 26
Direction: SSW
Distance: 0.871 mi., 4602 ft.
Elevation: 636 ft.
Relative: Lower

Site Name : U5017
41.953806, -74.115222
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166275
EPA ID: N/R

WELLS - NY

Report Date :	2006-07-03
Well Number :	U5017
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2006-06-16
Driller Completion Date :	2006-06-16
Method :	GPS
Well Depth (Feet) :	323
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	5
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 27
Direction: NE
Distance: 0.920 mi., 4859 ft.
Elevation: 507 ft.
Relative: Lower

Site Name : U4207
41.975833, -74.097833
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165488
EPA ID: N/R

WELLS - NY

Report Date :	2005-09-14
Well Number :	U4207
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2005-09-12
Driller Completion Date :	2005-09-12
Method :	GPS
Well Depth (Feet) :	123
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	30
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 28
Direction: WSW
Distance: 0.933 mi., 4929 ft.
Elevation: 628 ft.
Relative: Lower

Site Name : U7171
41.958167, -74.1245
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7167528
EPA ID: N/R

WELLS - NY

Report Date :	2009-04-02
Well Number :	U7171
Well Location :	197 STONE RD, WEST HURLEY, NY
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10164
Driller Start Date :	2008-12-05
Driller Completion Date :	2008-12-05
Method :	GPS
Well Depth (Feet) :	167
Depth to Bedrock (Feet) :	0
Depth to Groundwater (Feet) :	20
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6.625
Casing 1 Length (Feet) :	10
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 28
Direction: WSW
Distance: 0.933 mi., 4929 ft.
Elevation: 628 ft.
Relative: Lower

Site Name : U7171
41.958167, -74.1245
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7167528
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	25
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 29
Direction: WNW
Distance: 0.941 mi., 4971 ft.
Elevation: 734 ft.
Relative: Higher

Site Name : U5838
41.969889, -74.126778
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7167141
EPA ID: N/R

WELLS - NY

Report Date :	2008-03-28
Well Number :	U5838
Well Location :	55 VINEGAR HILL RD, WEST HURLEY, NY 12791
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10828
Driller Start Date :	2008-03-13
Driller Completion Date :	2008-03-27
Method :	N/R
Well Depth (Feet) :	150
Depth to Bedrock (Feet) :	7
Depth to Groundwater (Feet) :	20
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	10
Casing 2 Diameter (Inches) :	6
Casing 2 Length (Feet) :	10
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	N/R
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: C30
Direction: WSW
Distance: 0.951 mi., 5020 ft.
Elevation: 657 ft.
Relative: Higher

Site Name : U5203
41.959056, -74.125611
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166450
EPA ID: N/R

WELLS - NY

Report Date :	2006-09-28
Well Number :	U5203
Well Location :	STONE RD, WELL 2
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2006-09-27
Driller Completion Date :	2006-09-27
Method :	GPS
Well Depth (Feet) :	347
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	30
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	10
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: 31
Direction: S
Distance: 0.964 mi., 5091 ft.
Elevation: 672 ft.
Relative: Higher

Site Name : U4655
41.951694, -74.109
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7165910
EPA ID: N/R

WELLS - NY

Report Date :	2005-12-19
Well Number :	U4655
Well Location :	N/R
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10178
Driller Start Date :	2005-12-16
Driller Completion Date :	2005-12-17
Method :	GPS
Well Depth (Feet) :	348
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	N/R
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	30
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R

Map Id: 31
Direction: S
Distance: 0.964 mi., 5091 ft.
Elevation: 672 ft.
Relative: Higher

Site Name : U4655
41.951694, -74.109
NY

Database(s) : [WELLS - NY] ***(cont.)***

Envirosite ID: 7165910
EPA ID: N/R

WELLS - NY ***(cont.)***

Yield Test Average Discharge (Gallons per Minute):	4
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

Map Id: C32
Direction: WSW
Distance: 0.972 mi., 5132 ft.
Elevation: 655 ft.
Relative: Higher

Site Name : U5202
41.958944, -74.126
NY

Database(s) : [WELLS - NY]

Envirosite ID: 7166449
EPA ID: N/R

WELLS - NY

Report Date :	2006-09-28
Well Number :	U5202
Well Location :	STONE RD, WELL 1
Town :	Hurley
County :	ULSTER
Driller Registration Number :	NYRD10076
Driller Start Date :	2006-09-27
Driller Completion Date :	2006-09-27
Method :	GPS
Well Depth (Feet) :	347
Depth to Bedrock (Feet) :	N/R
Depth to Groundwater (Feet) :	30
Cased Depth (Feet) :	N/R
Casing 1 Diameter (Inches) :	6
Casing 1 Length (Feet) :	20
Casing 2 Diameter (Inches) :	N/R
Casing 2 Length (Feet) :	N/R
Screened :	N
Screen Length (Feet) :	N/R
Yield Test Average Discharge (Gallons per Minute):	10
Well Purpose :	Domestic
Last Date in Agency List :	2022-02-09

RADON DATA:

STATE SOURCE: No Available Data

FEDERAL AREA RADON INFORMATION FOR: No Available Data

NUMBER OF SAMPLE SITES: No Available Data

FEDERAL EPA RADON ZONE FOR ULSTER COUNTY: Zone = 1

Note: Zone 1 indoor average level > 4 pCI/L

: Zone 2 indoor average level > = 2 pCI/L and <= 4 pCI/L

: Zone 3 indoor average < 2 pCI/L

HIST PWS ENF
Historical Public Water Supply locations with Enforcement Violations
Environmental Protection Agency
(800) 426-4791
List of Safe Drinking Water Information Systems (SDWIS) with enforcement violations that are no longer in current agency list.

NWIS
National Water Information Systems
United States Geological Society
(703) 648-5953
Information on all water resources for the United States. This database contains all current and historical data for the nation.

PWS
Public Water Supply
Environmental Protection Agency
(800) 426-4791
Safe drinking water information Systems

PWS ENF
Public Water Supply locations with Enforcement Violations
Environmental Protection Agency
(800) 426-4791
Safe drinking water information Systems with enforcememnt violations

WELLS - NY
State Water Well Sites
Department of Environmental Conservation
518.402.8233
State Water Wells Sites

FLOOD Q3
Flood data
Environmental Protection Agency
(202) 566-1667
Q3 Flood Data

HYDROLOGIC UNIT
Hydrologic Unit Maps
USGS
The United States Geological Survey created a hierarchical system of hydrologic units originally called regions, sub-regions, accounting units, and cataloging units. Each unit was assigned a unique Hydrologic Unit Code (HUC). As first implemented the system had 21 regions, 221 subregions, 378 accounting units, and 2,264 cataloging units. Over time the system was changed and expanded. As of 2010 there are six levels in the hierarchy, represented by hydrologic unit codes from 2 to 12 digits long, called regions, subregions, basins, subbasins, watersheds, and subwatersheds. The table below describes the system's hydrologic unit levels and their characteristics, along with example names and codes.

WETLANDS NWI
National Wetland Inventory
U.S. Fish and Wildlife Service
(703) 358-2171
Wetland Inventory for the United States

SSURGO
Detailed Soil Data Map
Natural Resources Conservation Service: U.S. Department of Agriculture
(202) 690-4985
Detailed Soil Data Map

STATSGO & MUI
General Soil Data Map
Natural Resources Conservation Service: U.S. Department of Agriculture
(202) 690-4985
General Soil Data Map

USGS GEOLOGIC AGE
USGS Digital Data Series DDS
Natural Resources Conservation Service: U.S. Department of Agriculture
(202) 690-4985
USGS Digital Data Series DDS: Geologic Age and Rock Stratigraphic Unit

OIL & GAS WELLS - NY
Oil & Gas Wells
Division of Mineral Resources
518-402-8072
Oil & Gas Wells Data

RADON
National Radon Database
U.S. Environmental Protection Agency
215-814-2469
A study of the EPA/State Residential Radon Survey and the National Residential Radon Survey.

RADON EPA
RADON EPA
U.S. Environmental Protection Agency
215-814-2469
EPA list of Radon zones

AIRPORT FACILITIES
Airport landing facilities
Federal Aviation Administration
(866) 835-5322
Airport landing facilities

BASINS
Better Assessment Science Integrating point & Non-point Sources
U.S. Environmental Protection Agency
855-246-3642
Integrated geographical information system national watershed data and environmental assessment known as Better Assessment Science Integrating point & Non-point Sources

DIGITAL OBSTACLE
Obstacles of interest to aviation users
Federal Aviation Administration
855-379-6518
The Digital Obstacle File describes all known obstacles of interest to aviation users in the U.S. with limited coverage of the Pacific the Caribbean Canada and Mexico. The obstacles are assigned unique numerical identifiers; accuracy codes and listed in order of ascending latitude within each state or area by FAA Region.

EPICENTERS
National Geographical Data Center
National Geographical Data Center
303-497-6826
List of recent and historic earthquakes and information.

FLOOD DFIRM
National Flood Hazard Layer Database
Federal Emergency Management Agency
The National Flood Hazard Layer Database (NFHL) is a computer database that contains the flood hazard map information from FEMAs Flood Map Modernization program. These map data are from Digital Flood Insurance Rate Map (DFIRM) databases and Letters of Map Revision.

APPENDIX C: PFAS-FREE DRILLING & EQUIPMENT RINSE WATER

PO Box 733
Marlboro, NY 12542
Phone 845-236-7823
Fax 845-236-3911

ENVIRONMENTAL LABWORKS, INC.

NYSDOH #10824

June 28, 2021

Dover Plains Water
P.O. Box 633
Sherman, CT 06784

Dear Debbie,

The following are the results of the analyses performed on a sample from **Dover Plains Water** received at the laboratory on 06/15/21.

Date/Time Collected: 06/15/21 10:40am
Collected By: C.C.
Sample ID: 06152125
Secondary Lab ID: DP211596
PWS ID: 1302761

LOCATION	PARAMETER	RESULTS		RL	MCL	ANALYZED
Well #1						
	EPA 522(Y1)					
	1,4-Dioxane	<0.200	ug/L	0.200	1	06/25/21
	EPA 537(Y2)					
	Perfluorooctanoic acid(PFOA)	<1.05	ng/L	1.05	10	06/23/21
	Perfluorooctanesulfonic acid(PFOS)	<1.05	ng/L	1.05	10	06/23/21
Field Blank						
	EPA 537(Y2)					
	Perfluorooctanoic acid(PFOA)	<1.67	ng/L	1.67	10	06/23/21
	Perfluorooctanesulfonic acid(PFOS)	<1.67	ng/L	1.67	10	06/23/21

Definitions:
MCL - Maximum Contaminant Level
RL - Reporting Limit

The data contained in this report were obtained using EPA or other approved methodologies. This laboratory or any outside laboratory used are NYSDOH certified for these analyses. Vendor laboratories used were ELAP #10854(Y1) and #12058(Y2). The results in this report apply to the samples received by the laboratory, analyzed in accordance with the chain of custody document. This analytical report may only be reproduced in its entirety.

PO Box 733
Marlboro, NY 12542
Phone 845-236-7823
Fax 845-236-3911

ENVIRONMENTAL LABWORKS, INC.

NYSDOH #10824

Dover Plains Water – 06152125

If you have any questions or require any additional services, please do not hesitate to contact us at 845-236-7823.

Thank you,

Judie Lund

for Anthony J. Falco
Laboratory Director

Annual Drinking Water Quality Report for 2021

City of Hudson

520 Warren Street, Hudson, NY 12534

(Public Water Supply Identification Number NY1000239)

INTRODUCTION

To comply with State regulations, the City of Hudson will be annually issuing a report describing the quality of your drinking water. The purpose of this report is to raise your understanding of drinking water and awareness of the need to protect our drinking water sources. Last year, your drinking water met all State drinking water health standards. This report is a snapshot of last year's water quality. Included are details about where your water comes from, what it contains, and how it compares to New York State standards. Our constant goal is and always has been, to provide to you a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and to protect our water resources. If you have any questions concerning this report or concerning your drinking water please contact: *Mr. George Topple, Jr., Chief Water Treatment Plant Operator, City of Hudson Water Treatment Plant, 520 Warren Street, Hudson, NY 12534; Telephone (519) 828-9458 or dpwclerk@cityofhudson.org*

WHERE DOES OUR WATER COME FROM?

The City of Hudson's water source is a clean and plentiful surface water reservoir located in Churchtown, New York. Water is treated with sodium permanganate as it leaves Churchtown Reservoir for iron, manganese and organic precursor removal. The treatment process at the Hudson WTP consists of; coagulation using poly aluminum chloride to cause small particles to stick together when the water is mixed, making larger heavier particles; sedimentation allows the newly formed larger particles to settle out naturally; The flocculation process is enhanced with the addition of a nonionic polyacrylamide polymer; the water is clarified in a upflow adsorption clarifier and then filtration removes smaller particles by trapping them on a mixed media filter; final post chlorination to maintain a chlorine residual in the distribution system to prevent bacterial contamination; the pH of the filtered water is adjusted with a 25% solution of liquid caustic soda and zinc orthophosphate is also added for corrosion control.

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include microbial contaminants; inorganic contaminants; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants. In order to ensure that tap water is safe to drink, the State and EPA prescribe regulations, which limit the amount of certain contaminants in water, provided by public water systems. The State Health Department's and the FDA's regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

FACTS AND FIGURES

Our water system provides water through 2,200 service connections to the entire population of 6,713 residents in the City of Hudson. In 2021 the city water system produced 359,700,000 gallons of water. Our average daily demand is 986,000 gallons. Our single highest day was 1,113,000 gallons. Because the majority of residential accounts are unmetered, there is no clear record of the total water consumed and billed. A recent study performed for the City estimated the unbilled water is 20% of the water produced. The unbilled water is used to flush transmission and distribution mains, for fighting fires or is lost through the distribution system. The annual charge for a residential customer was $420.00 per unit for combined water/sewer.

ARE THERE CONTAMINANTS IN OUR DRINKING WATER?

In accordance with State regulations, the City of Hudson routinely monitors your drinking water for numerous contaminants. We test your drinking water for inorganic contaminants, radiological contaminants, lead and copper, nitrate, volatile organic contaminants, and synthetic organic contaminants. In addition, we test 9 samples for coliform bacteria each month. The table presented on page 3 depicts which contaminants were detected in your drinking water. The state allows us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old and is noted. For a listing of the parameters we analyzed that were not detected along with the frequency of testing for compliance with the NYS Sanitary Code, see Appendix A.

It should be noted that all drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily pose a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791) or the Columbia County Public Health Services at (519) 828-3358.

WHAT DOES THIS INFORMATION MEAN?

As you can see by the table on page 3, our system had no violations. We have learned through our monitoring and testing that some contaminants have been detected; however, these compounds were detected below New York State requirements. MCL's are set at very stringent levels. To understand the possible health effects described for many regulated contaminants, a person would have to drink 2 liters of water every day at the MCL level for a lifetime to have a one-in-a-million chance of having the described health effect.

New York State has adopted the first in the nation drinking water standard for 1,4-Dioxane along with one of the lowest maximum contaminant levels for PFOA and PFOS. Public Water Supplies in NYS are required to test for PFOA, PFOS and 1,4-Dioxane. PFOA and PFOS have Maximum Contaminant Levels (MCL) of 10 parts per trillion each while 1,4-Dioxane has an MCL of 1.0 parts per billion. The City of Hudson Water Department has completed its 2nd,3rd & 4th quarter monitoring with no detects for PFOA, PFOS &1,4-Dioxane.

IS OUR WATER SYSTEM MEETING OTHER RULES THAT GOVERN OPERATIONS?

During 2021, our system was in compliance with applicable State drinking water operating, monitoring and reporting requirements.

DO I NEED TO TAKE SPECIAL PRECAUTIONS?

Some people may be more vulnerable to disease causing microorganisms or pathogens in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care provider about their drinking water. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium, Giardia and other microbiological pathogens are available from the Safe Drinking Water Hotline (800-426-4791).

When operated under appropriate conditions, commonly used filtration technologies such as ours can effectively remove *Giardia* cysts from water. The highest removal by granular filters is achieved when coagulation is optimized. EPA's Surface Water Treatment Rule requires public water systems such as ours so we can insure 99.9% *Giardia* removal.

INFORMATION ON LEAD

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Hudson is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at *http://www.epa.gov/safewater/lead*

WATER CONSERVATION TIPS

The City of Hudson encourages water conservation. There are a lot of things you can do to conserve water in your own home. Conservation tips include:

- Only run the dishwasher and clothes washer when there is a full load
- Use water saving showerheads
- Install faucet aerators in the kitchen and the bathroom to reduce the flow from 4 to 2.5 gallons per minute
- Water gardens and lawn for only a couple of hours after sunset
- Check faucets, pipes and toilets for leaks and repair all leaks promptly
- Take shorter showers

CAPITAL IMPROVEMENTS

In 2022 the City of Hudson has one new main installation scheduled:

- The existing 4-inch cast iron water main on Washington Street between N 5th Street and N 6th Street will be replaced with new 12-inch ductile iron. The replacement of the older existing main and lead water services is a continuation of the city's water main replacement project.

CLOSING

Thank you for allowing us to continue providing your family with clean, quality water this year. In order to maintain a safe and dependable water supply we sometimes need to make improvements that will benefit our customers. We ask that all our customers help us protect our water sources, which are the heart of our community. Please call our office if you have questions.

CITY OF HUDSON TABLE OF DETECTED CONTAMINANTS Public Water Supply Identification Number NY1000239						
Contaminant	Violation Y/N	Level Detected	Unit Measurement	MCLG	MCL	Likely Source of Contamination
Microbiological Contaminants						
Turbidity[1] (Highest turbidity sample from 11/5/20)	N	0.12[1] 100	NTU		TT=1.0 NTU TT= 95% of samples <0.3 NTU	Soil runoff
Inorganic Contaminants (sample data from 2/18/21 unless otherwise noted)						
Chloride	N	33.8	ppm	N/A	250	Geology; Naturally occurring
Copper (data from 6/11/19-7/12/19) Range of copper concentration	N	90[2] ND-100	ppb	1300	AL=1300	Corrosion of household plumbing systems
Lead (data from 6/11/19-7/12/19) Range of lead concentration	N	ND[3] ND-3	ppb	0	AL=15	Corrosion of household plumbing systems, erosion of natural deposits
Nitrate	N	0.513	ppm	10	10	Erosion of natural deposits
Odor	N	1	units	N/A	3	Natural Sources
pH	N	7.52	units		6.5-8.5	Geology; Naturally occurring
Sodium[4]	N	21.7	ppm	N/A	N/A	Geology; Road Salt
Sulfate	N	10.1	ppm	N/A	250	Geology;
Zinc	N	233	ppb	N/A	5000	Galvanized pipe; **corrosion inhibitor**
Disinfection Byproducts (Quarterly samples from 2/18/21, 5/19/21, 8/10/21 & 11/29/21)						
Chlorine (average) Range of chlorine residual based on daily testing	N	1.75 1.42-2.21	ppm	MRDLG N/A	MRDL 4	Used in the treatment and disinfection of drinking water
Stage 2 Haloacetic Acids (HAA5)5[5] Range of values for HAA5 (Train Station)	N	28.8 17.8-44.3	ppb	N/A	60	By-product of drinking water chlorination.
Stage 2 Total Trihalomethanes (TTHM)(Average) [5] Range of values for THM (Train Station)	N	49.0 18.4-92.1	ppb	0	80	By-product of drinking water chlorination
Stage 2 Haloacetic Acids[5] Range of values for HAA5 (Water Pollution Control)	N	26.8 14.6-34.2	ppb	N/A	60	By-product of drinking water chlorination
Stage 2 Total Trihalomethanes[5] Range of values for THM (Water Pollution Control)	N	46.5 18.8-81.9	ppb	0	80	By-product of drinking water chlorination
Total Organic Carbon[6] (monthly samples from Jan.-Dec. 2021)						
Raw Water Treated Water	N	2.3-5.1 1.08-1.73	ppm	NA	TT	Organic material both natural and man made; Organic pollutants, decaying vegetation.
Synthetic Organic Chemicals (sample from 10/5/20)						
2,4-D 2,4-Dichlorophenoxyacetic	N	0.149	ppb	N/A	50	Release to the environment by its application as a pesticide used to control broad leaf needs in agriculture and for control of woody plants along roadsides, railways, and utility rights-of-way

Notes:

1. Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system. Distribution system turbidity is performed weekly with 1.47 NTU being the highest level detected. Our average distribution turbidity is 0.168 NTU.
2. The level presented represents the 90th percentile of 20 test sites. The action level for copper was not exceeded at any of the 20 sites tested
3. The level presented represents the 90th percentile of 20 test sites. The action level for lead was not exceeded at any of the 20 sites tested
4. Water containing more than 20 mg/l should not be consumed by persons on severely restricted sodium diets.
5. The average is based on a Locational Running Annual Average (LRAA). The average shown is the highest LRAA for 2021. The highest LRAA for the Train Station was the 3rd quarter for the TTHMs and 2nd quarter for the HAA5s. For the Water Pollution Control STP the highest LRAAs were the 3rd quarter for the TTHMs and 2nd quarter for the HAA5s. was in the 3rd quarter of 2021.
6. The Interim Enhanced Surface Water Treatment Rule (IESWTR) requires monitoring of raw and finished water Total Organic Carbon (TOC). Depending on the raw water alkalinity value, proper water treatment should remove between 15% to 45% of the raw water TOC thus reducing the amount of disinfection byproducts produced

Non-Detects (ND) - laboratory analysis indicates that the constituent is not present.
Parts per million (ppm) or Milligrams per liter (mg/l) - one part per million corresponds to one minute in two years or a single penny in $10,000.
Parts per billion (ppb) or Micrograms per liter - one part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.
Nephelometric Turbidity Unit (NTU) - nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
90th Percentile Value- The values reported for lead and copper represent the 90th percentile. A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it. The 90th percentile is equal to or greater than 90% of the lead and copper values detected at your water system
Action Level - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Treatment Technique (TT) -A treatment technique is a required process intended to reduce the level of a contaminant in drinking water.
Maximum Contaminant Level - The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal - The "Goal" (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
Locational Running Average (LRA): The LRA is calculated by taking the average of the four most recent samples collected at each individual site.
N/A-not applicable

Appendix A

New York State Sanitary Code Compliance Monitoring Requirements- Compounds Analyzed that were Below Limits of Detection

CITY OF HUDSON TEST RESULTS Public Water Supply Identification Number NY1000239					
CONTAMINANT	MONITORING FREQUENCY		CONTAMINANT	CONTAMINANT	MONITORING FREQUENCY
Asbestos	Every 9 years Sample from 5/11/21		**POC's (Volatile Organic Compounds)**		
			Benzene	Trans-1,3-Dichloropropene	
Antimony	Monitoring requirement is one sample annually		Bromobenzene	Ethylbenzene	2/18/21
Arsenic			Bromochloromethane	Hexachlorobutadiene	
			Bromomethane	Isopropylbenzene	
Beryllium			N-Butylbenzene	p-Isopropyltoluene	
Cadmium	Sample results from 2/18/21		sec-Butylbenzene	Methylene Chloride	
Chromium			Tert-Butylbenzene	n-Propylbenzene	
Cyanide	**NON-DETECT**		Carbon Tetrachloride	Styrene	
Mercury			Chlorobenzene	1,1,1,2-Tetrachloroethane	**NON-DETECT**
Nickel			2-Chlorotoluene	1,1,2,2-Tetrachloroethane	
Selenium			4-Chlorotoluene	Tetrachloroethene	
Thalium			Dibromethane	Toluene	
			1,2-Dichlorobenzene	1,2,3-Trichlorobenzene	
			1,3-Dichlorobenzene	1,2,4-Trichlorobenzene	
			1,4-Dichlorobenzene	1,1,1-Trichloroethane	
			Dichlordifluoromethane	1,1,2-Trichloroethane	
			1,1-Dichloroethane	Trichloroethene	
			1,2-Dichloroethane	Trichlorofluoromethane	
Silver	Monitoring requirement is at State discretion		1,1 Dichloroethene	1,2,3-Trichloropropane	
Iron			cis-1,2 Dichloroethene	1,2,4-Trimethylbenzene	
Manganese			Trans-1,2-Dichloroethene	1,3,5-Trimethylbenzene	
Color	Sample results from 2/18/21		1,2 Dichloropropane	m-Xylene	
			1,3 Dichloropropane	o- Xylene	
			2,2 Dichloropropane	p-Xylene	
	NON-DETECT		1,1 Dichloropropene	Vinyl Chloride	
			Cis-1,3-Dichloropropene		
			Total Coliform / E. coli		Monitoring is 9 samples/ month **NON-DETECT**
			Radiological Parameters		
			Gross Beta particle activity		requirement is one sample every 6-9 years Sample from 4/5/17 **NON-DETECT**
			Radium 226 & 228		
Regulated & Unregulated Synthetic Organic Chemicals					
Synthetic Organic Chemicals (Group I)			Synthetic Organic Chemicals (Group II)		
Alachlor	Aldicarb		Aldrin	Benzo(a)pyrene	Monitoring requirement is every 18 months **NON DETECT** Sample 10/5/20 **^State waiver does not require monitoring these compounds *samples from 1/5/21,4/13/21 & 8/4/21**
Aldicarb Sulfoxide	Aldicarb Sulfone		Butachlor	Carbaryl	
Atrazine	Carbofuran		Dalapon	Di(2-ethylhexyl)adipate	
Chlordane	Dibromochloropropane		Di(2-ethylhexyl)pthalate	Dicamba	
	Endrin		Dieldrin	Dinoseb	
Ethylene Dibromide	Heptachlor		Diquat*	Endothall*	
Lindane	Methoxyhlor		Glyphosate*	Hexachlorobenzene	
PCB's	Toxaphene		Hexachlorocyclopentadiene	3-Hydroxycarbofuran	
2,4,5-TP (Silvex)	1,4-Dioxane*		Methomyl	Metolachlor	
1,4 Dioxane	PFOA*		Metribuzin	Oxamyl vydate	
PFOS	PFOS*		Pichloram	Propachlor	
PFOA			Simazine	2,3,7,8-TCDD (Dioxin)^	

City of Hudson
PWSID 1000239
Source Water Assessment Summary

The NYSDOH has completed a source water assessment for this system, based on available information. Possible and actual threats to this drinking water source were evaluated. The state source water assessment includes a susceptibility rating based on the risk posed by each potential source of contamination and how easily contaminants can move through the subsurface to the wells. The susceptibility rating is an estimate of the potential for contamination of the source water, it does not mean that the water delivered to consumers is, or will become contaminated. See section "Are there contaminants in our drinking water?" for a list of the contaminants that have been detected, if any. The source water assessments provide source managers with additional information for protecting source waters into the future.

The source water assessment has rated the Churchtown Reservoir as having a medium-high susceptibility to microbial and phosphorus, and a low rating to organics, industrial solvents, nitrates and other industrial contaminants. Land cover and its associated activities within the assessment area does not increase the potential for contamination. No permitted discharges are found in the assessment area. There is also noteworthy contamination susceptibility associated with other discrete contaminant sources, and these facility types include: mines. It should be noted that hydrologic characteristics (e.g. basin shape and flushing rates) generally make reservoirs highly sensitive to existing and new sources of phosphorus and microbial contamination.

The county and state health departments will use this information to direct future source water protection activities. These may include water quality monitoring, resource management, planning and education programs. A copy of the assessment can be obtained by contacting us.

APPENDIX D: SOIL BORING & MW COMPLETION LOGS
NEW WELLS MW-8, MW-9, MW-10 & MW-11

BOREHOLE LOG

Crawford & Associates Engineering, and Land Surveying, P.C.

Boring No: MW-8

Project Name:	Hurley Landfill	**Project No:**	5447.0
Client Name:	Town of Hurley	**Date:**	4/4/2023
Location:	Dug Hill Rd	**Logged By:**	MP
Weather/Temp:	Cool, sunny	**Checked By:**	KP
Drilling Co:	Down Core Drilling	**Depth:**	31'
Driller:	Andrew Bellucci	**Equipment:**	Track Drill Rig & Air Hammer
Date Started:	11/23/2022	**Method:**	Hollow Stem Auger & Percussion Drilling
Date Completed:	11/23/2022	**Sample:**	MP

Depth	Sample No.	Blow Counts	Graphic Log 1"=__'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till,lacustrine, muck, fill)	PID Reading (PPM)	COMMENTS
0-2'					Overburden- rubble stone, brown clay	0	
2'-6'					brown clay	0	
6'-7'					Bedrock	0	Rock surface at 6'-7'
13'					Bedrock	**0**	Groundwater
31'					Bedrock	0	Bottom

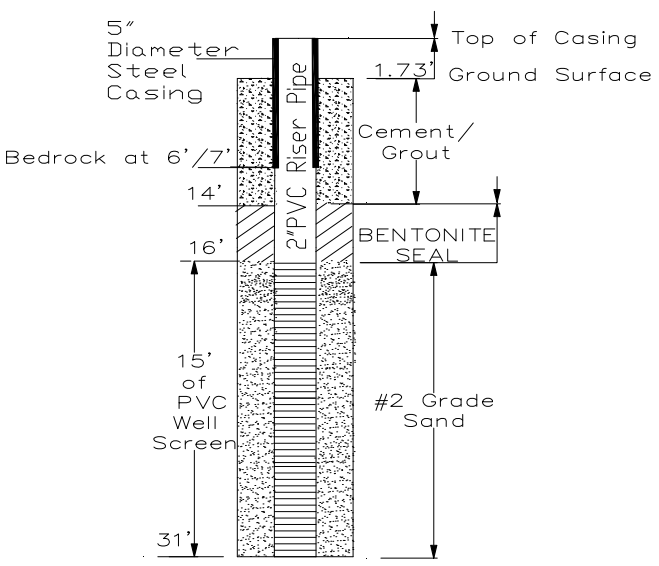
MONITORING WELL COMPLETION LOG

Crawford & Associates Engineering & Land Surveying, P.C.

Well I.D.: MW-8

Project Name:	Hurley Landfill
Client Name:	Town of Hurley
Location:	Dug Hill Rd
Date Drilled:	11/23/2022

WELL CONSTRUCTION DETAILS



Not To Scale

INSPECTION NOTES

Inspector:	M. Pentz
Contractor:	Core Down Drilling
Drilling Method:	
Type:	Hollow Stem Auger & Air Hammer
Equipment:	Track Mount Drill Rig
Type of Well:	Bedrock Monitoring Well
Static Water Level:	5.3'
Measuring Point:	Top of Casing
Total Depth of Well:	31'
Riser Pipe Left in Place:	
Material:	PVC Schedule 40 Riser (w/ 5" Steel Outer Casing)
Length:	32.4'
Diameter:	2"
Well Details:	
Type:	PVC Schedule 40 Stick-Up
Sand Pack:	2' Above the Screen
Cement:	Type 1 Portland Cement / Grout
Well Screen:	
Material:	PVC Schedule 40
Slot Size:	10 mil (0.01")
Stratigraphic Unit Screened:	Bedrock
Filter Pack:	
Type:	Sand
Grade:	#2 Grade Filter Sand
Seal:	
Type:	Bentonite

BOREHOLE LOG

Crawford & Associates Engineering, and Land Surveying, P.C.

Boring No: MW-9

Project Name:	Hurley Landfill	**Project No:**	5447.0
Client Name:	Town of Hurley	**Date:**	4/4/2023
Location:	Dug Hill Rd	**Logged By:**	MP
Weather/Temp:	Cool, sunny	**Checked By:**	KP
Drilling Co:	Down Core Drilling	**Depth:**	51'
Driller:	Andrew Bellucci	**Equipment:**	Track Drill Rig & Air Hammer
Date Started:	11/22/2022	**Method:**	Hollow Stem Auger & Percussion Drilling
Date Completed:	11/22/2022	**Sample:**	MP

Depth	Sample No.	Blow Counts	Graphic Log 1"=__'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till,lacustrine, muck, fill)	PID Reading (PPM)	COMMENTS
0-2'					Overburden- rubble stone, brown clay	0	
2'-6'					Brown clay	0	
6'-7'					Bedrock	0	Rock surface at 6'-7'
13'					Bedrock	0	
22'					Bedrock		Groundwater
51'					Bedrock	0	Bottom

MONITORING WELL COMPLETION LOG

Crawford & Associates Engineering & Land Surveying, P.C.

Well I.D.: MW-9

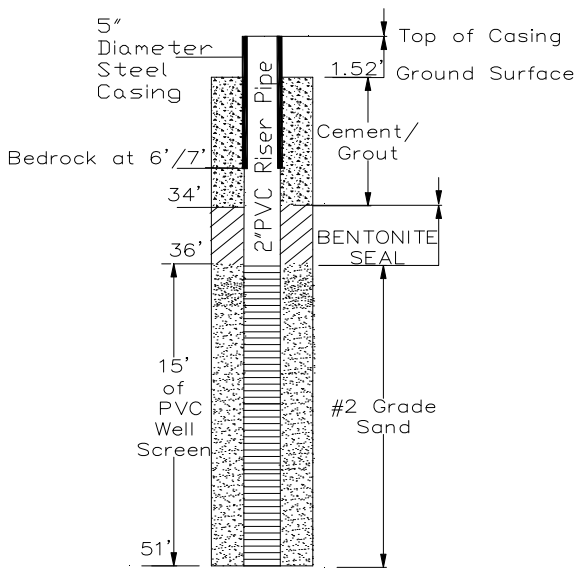
Project Name: Hurley Landfill

Client Name: Town of Hurley

Location: Dug Hill Rd

Date Drilled: 11/22/2022

WELL CONSTRUCTION DETAILS



Not To Scale

INSPECTION NOTES

Inspector: M. Pentz

Contractor: Core Down Drilling

Drilling Method:

Type: Hollow Stem Auger & Air Hammer

Equipment: Track Mount Drill Rig

Type of Well: Bedrock Monitoring Well

Static Water Level: 22.3'

Measuring Point: Top of Casing

Total Depth of Well: 51'

Riser Pipe Left in Place:

Material: PVC Schedule 40 Riser (w/ 5" Steel Outer Casing)

Length: 52.22'

Diameter: 2"

Well Details:

Type: PVC Schedule 40 Stick-Up

Sand Pack: 2' Above the Screen

Cement: Type 1 Portland Cement / Grout

Well Screen:

Material: PVC Schedule 40

Slot Size: 10 mil (0.01")

Stratigraphic Unit Screened: Bedrock

Filter Pack:

Type: Sand

Grade: #2 Grade Filter Sand

Seal:

Type: Bentonite

BOREHOLE LOG

Crawford & Associates Engineering, and Land Surveying, P.C.

Boring No: MW-10

Project Name:	Hurley Landfill	**Project No:**	5447.0
Client Name:	Town of Hurley	**Date:**	4/4/2023
Location:	Dug Hill Rd	**Logged By:**	MP
Weather/Temp:	Cool, sunny	**Checked By:**	KP
Drilling Co:	Down Core Drilling	**Depth:**	42'
Driller:	Andrew Bellucci	**Equipment:**	Track Drill Rig & Air Hammer
Date Started:	11/21/2022	**Method:**	Hollow Stem Auger & Percussion Drilling
Date Completed:	11/21/2022	**Sample:**	MP

Depth	Sample No.	Blow Counts	Graphic Log 1"=__'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till,lacustrine, muck, fill)	PID Reading (PPM)	COMMENTS
0-2'					Overburden- rubble stone, brown clay	0	
2'-5'					Brown clay	0	
10'					Trash (Plastic bags, rug fragments, small metal items)	0	
13'					Bedrock	0	Groundwater
42'					Bedrock	0	Bottom

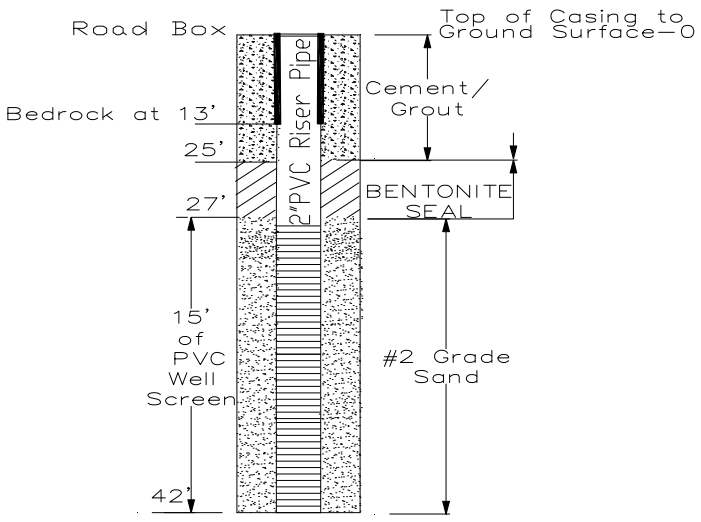
MONITORING WELL COMPLETION LOG

Crawford & Associates Engineering & Land Surveying, P.C.

Well I.D.: MW-10

Project Name:	Hurley Landfill
Client Name:	Town of Hurley
Location:	Dug Hill Rd
Date Drilled:	11/21/2022

WELL CONSTRUCTION DETAILS



Not To Scale

INSPECTION NOTES

Inspector:	M. Pentz
Contractor:	Core Down Drilling

Drilling Method:

Type:	Hollow Stem Auger & Air Hammer
Equipment:	Track Mount Drill Rig
Type of Well:	Bedrock Monitoring Well
Static Water Level:	13'
Measuring Point:	Top of Casing
Total Depth of Well:	42'

Riser Pipe Left in Place:

Material:	PVC Schedule 40 Riser (w/ 5" Steel Outer Casing)
Length:	41.7'
Diameter:	2"

Well Details:

Type:	PVC Schedule 40 Flush Mount
Sand Pack:	2' Above the Screen
Cement:	Type 1 Portland Cement / Grout

Well Screen:

Material:	PVC Schedule 40
Slot Size:	10 mil (0.01")
Stratigraphic Unit Screened:	Bedrock

Filter Pack:

Type:	Sand
Grade:	#2 Grade Filter Sand

Seal:

Type:	Bentonite

BOREHOLE LOG

Crawford & Associates Engineering, and Land Surveying, P.C.

Boring No: MW-11

Project Name:	Hurley Landfill	**Project No:**	5447.0
Client Name:	Town of Hurley	**Date:**	4/4/2023
Location:	Dug Hill Rd	**Logged By:**	MP
Weather/Temp:	Cool, sunny	**Checked By:**	KP
Drilling Co:	Down Core Drilling	**Depth:**	92.9'
Driller:	Andrew Bellucci	**Equipment:**	Track Drill Rig & Air Hammer
Date Started:	11/18/2022	**Method:**	Hollow Stem Auger & Percussion Drilling
Date Completed:	12/2/2022	**Sample:**	MP

Depth	Sample No.	Blow Counts	Graphic Log 1"=__'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till,lacustrine, muck, fill)	PID Reading (PPM)	COMMENTS
0-2'					Overburden- rubble stone, brown clay	0	
2'-6'					brown clay	0	
6'-7'					Bedrock	0	Rock surface at 6'-7'
72'					Bedrock	0	Groundwater
92.9'					Bedrock	0	Bottom

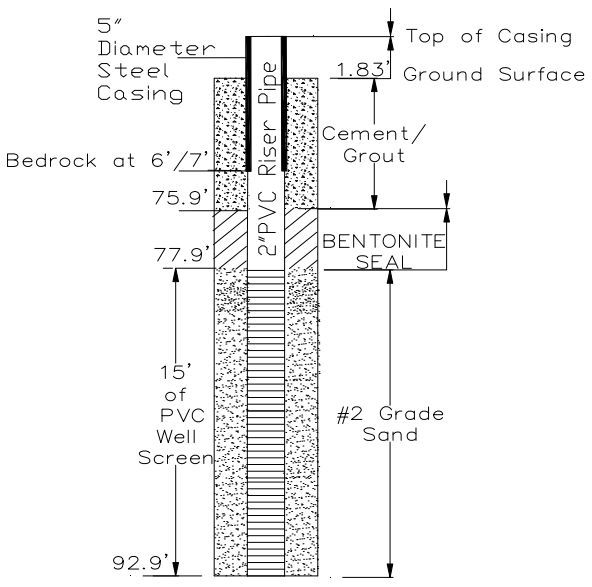
MONITORING WELL COMPLETION LOG

Crawford & Associates Engineering & Land Surveying, P.C.

Well I.D.: MW-11

Project Name:	Hurley Landfill
Client Name:	Town of Hurley
Location:	Dug Hill Rd
Date Drilled:	11/18/2022

WELL CONSTRUCTION DETAILS



Not To Scale

INSPECTION NOTES

Inspector:	M. Pentz
Contractor:	Core Down Drilling
Drilling Method:	
Type:	Hollow Stem Auger & Air Hammer
Equipment:	Track Mount Drill Rig
Type of Well:	Bedrock Monitoring Well
Static Water Level:	72'
Measuring Point:	Top of Casing
Total Depth of Well:	92.9'
Riser Pipe Left in Place:	
Material:	PVC Schedule 40 Riser (w/ 5" Steel Outer Casing)
Length:	94.43'
Diameter:	2"
Well Details:	
Type:	PVC Schedule 40 Stick-Up
Sand Pack:	2' Above the Screen
Cement:	Type 1 Portland Cement / Grout
Well Screen:	
Material:	PVC Schedule 40
Slot Size:	10 mil (0.01")
Stratigraphic Unit Screened:	Bedrock
Filter Pack:	
Type:	Sand
Grade:	#2 Grade Filter Sand
Seal:	
Type:	Bentonite

APPENDIX E:
WATER QUALITY PARAMETER LOGS

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/15 /22
Field Personnel: Pentz
Monitoring Well No.: MW-1
PID Reading 0.0 ppm

Depth to well water: 10.30 ft
Depth to well bottom: 48 ft.
Purging Device (pump type): QED MP50 & Bladder pump
Purged Volume: 5 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1140	8.56	0.206	6.58	119	50.0	13.9	
1145	8.49	0.195	6.37	117	50.00	7.8	
1150	8.55	0.197	6.28	119	50.00	7.7	
1155	8.73	0.196	6.18	124	50.00	6.6	
1200	10.33	0.218	5.95	189	50.00	5.7	
1205	9.55	0.21	5.98	183	50.0	5.3	
1210	9.54	0.209	5.95	183	50.00	5.1	
1215	9.53	0.207	5.97	185	50.00	5.5	
1220	9.55	0.211	5.96	186	50.0	5.4	
1225	12.37	0.198	6.08	217	50.0	7.1	
1230	10.75	0.197	6.03	220	50.0	4.3	
1235	10.69	0.194	6.03	222	50.0	4.4	
1240	10.34	0.195	6.02	228	50.0	4.2	
1245	10.3	0.194	6.01	222	50.0	4.4	
1250	10.26	0.198	6.03	228	50.0	4.7	
1255	12.39	7.00	5.97	239	50.0	6.7	
1300	11.88	0.183	6.13	235	50.0	7.5	3 gallons
1305	10.87	0.185	6.12	242	50.0	4.5	
1310	10.64	0.182	6.11	247	50.0	4.8	
1315	10.62	0.182	6.12	246	50.0	4.9	
1320	11.95	0.173	6.13	248	50.0	5.5	
1325	12.23	0.17	6.23	246	50.00	4.9	
1330	11.66	0.167	6.35	244	50.00	4.4	
1335	11.05	0.168	6.31	248	50.00	4.2	
1340	10.94	0.167	6.31	249	50.00	4.6	
1345	10.85	0.165	6.3	249	50.00	4.5	2 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/14/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-3
PID Reading 0.0 ppm

Depth to well water: 12.9 ft
Depth to well bottom: 31.3 ft.
Purging Device (pump type): QED MP50 & Bladder pum
Purged Volume: 11 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1230	13.86	0.535	7.07	44	50.0	37.4	
1235	13.72	0.535	7.19	41	50.0	28.6	
1240	13.77	0.534	7.14	39	50.0	26.4	
1245	13.69	0.534	7.16	41	50.0	27.6	
1250	13.81	0.533	7.15	35	50.0	24.5	
1255	13.73	0.533	7.21	35	50.0	19.4	
1300	13.77	0.533	7.31	35	50.0	16.9	
1305	13.66	0.532	7.57	34	50.0	16.3	4 gallons
1310	13.74	0.531	7.48	34	50.0	15.4	
1315	13.75	0.531	7.53	36	50.0	14.2	
1320	13.84	0.530	7.35	41	50.0	15.3	
1325	13.67	0.529	7.48	34	50.0	13.0	
1330	13.75	0.528	7.42	41	50.0	12.8	
1335	13.7	0.527	7.41	35	50.0	12.3	
1340	13.7	0.526	7.51	34	50.0	13.5	
1345	13.73	0.525	7.46	31	50.0	12.1	
1350	13.64	0.523	7.48	35	50.0	11.4	
1355	13.63	0.523	7.44	34	50.0	11.4	4 gallons
1400	13.6	0.523	7.4	38	50.0	13.3	
1405	13.64	0.519	7.36	35	50.0	10.9	
1410	13.61	0.519	7.38	38	50.0	9.5	
1415	13.57	0.519	7.36	36	50.0	9.0	
1420	13.65	0.519	7.31	40	50	8.4	
1425	13.6	0.518	7.39	36	50	9	
1430	13.54	0.519	7.27	41	50	9.3	3 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/14/22
Field Personnel: Pentz
Monitoring Well No.: MW-4
PID Reading: 0.0 ppm

Depth to well water: 4.7 ft
Depth to well bottom: 25 ft.
Purging Device (pump type): QEDMP50 & Bladder pum
Purged Volume: 4 gallon

Time 24 Hour	Temp C	Specific Conductivity us/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
115	11.44	0.492	6.07	190	30.3	59.9	
120	11.44	0.492	6.07	190	30.3	59.9	
125	11.44	0.492	6.07	190	30.3	59.9	
130	11.91	0.189	6.10	189	106.5	47.5	
135	12.42	1.04	5.82	-61	1.72	32.5	
140	12.5	1.17	5.80	-68	1.41	28.0	
145	12.75	1.48	5.89	-77	0.88	24.4	
150	12.58	1.5	6.00	-84	1.59	21.9	
155	13.00	1.36	5.77	-76	1.24	20.6	2 gallon
*Equipment malfunction (battery for QED low power - had to go get different battery)							
300	10.05	1.45	5.94	-53	1.34	110	
305	10.69	1.52	5.97	-63	0.34	59.4	
310	10.77	1.52	5.97	-66	0.36	64.1	
315	11.48	1.54	5.98	-70	0.27	19.1	
320	11.03	1.56	6.02	-75	0.42	17.5	
325	9.99	1.53	5.71	-59	0.37	15.5	
330	9.90	1.58	5.69	-60	0.37	15.1	
335	10.70	1.59	5.9	-72	0.09	11.6	
340	11.43	1.56	5.9	-72	0.00	9.9	
345	11.42	1.57	5.89	-74	0.14	10.1	
350	9.81	0.22	9.78	-121	7.06	18.1	
355	9.69	0.432	5.76	-121	2.83	10.9	
400	9.36	1.61	9.35	-80	0.16	9.6	
405	11.47	1.6	6.03	-71	0.01	9.9	
410	11.45	1.56	5.96	-70	0.18	9.1	
415	10.07	1.62	6.05	-77	0.30	8.6	2 gallon

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/17/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-5
PID Reading: 0.0 ppm

Depth to well water: 21.35 ft
Depth to well bottom: 39.5 ft.
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 10 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
950	12.46	0.401	7.11	61	3.25	46	
955	12.47	0.392	7.07	90	3.000	29	
1000	12.47	0.388	7.05	97	3.01	25.8	
1005	12.48	0.384	6.99	107	2.53	15.8	
1010	12.48	0.381	6.95	115	2.17	13.7	
1015	12.4	0.375	6.95	119	2.61	16.2	
1020	12.49	0.361	6.96	126	1.68	17.7	
1025	12.38	0.351	6.97	128	1.57	18.2	
1030	12.49	0.336	6.97	133	2.00	15.5	
1035	12.54	0.334	6.98	136	1.44	13.7	
1040	12.54	0.334	6.98	136	1.44	13.7	
1045	12.66	0.369	6.99	142	0.7	12	
1050	12.66	0.397	6.97	144	0.7	10	
1055	12.64	0.398	6.98	144	0.7	10	5 gallons
1100	12.56	0.423	6.97	145	1.28	8.4	
1105	12.69	0.44	6.96	144	0.81	7.6	
1110	12.61	0.441	6.98	144	0.99	9.8	
1115	12.61	0.451	6.97	145	0.88	6.5	
1120	12.55	0.46	6.96	145	0.94	6.4	
1125	12.59	0.366	6.65	163	1.14	11.3	
1130	12.45	0.478	6.8	153	1.01	6.9	
1135	12.48	0.485	6.95	145	0.89	6.2	
1140	12.7	0.496	6.92	147	0.63	5	
1145	12.34	0.396	6.62	154	0.63	4.8	
1150	12.16	0.496	6.74	156	0.6	4.9	
1155	12.39	0.508	6.92	142	0.53	4.6	
1200	12.67	0.512	6.91	143	0.64	6.2	
1205	12.69	0.513	6.89	143	0.73	5.7	5 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/22/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-6A
PID Reading: 0.0 ppm

Depth to well water: 21.35 ft
Depth to well bottom: 28.7 ft
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 3 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1225	12.95	2.59	7.94	-137	11.39	41.4	
1230	13.19	2.55	8.02	-136	10.690	53.3	
1235	13.33	2.53	8.08	-134	9.7	61.3	
1240	13.45	2.5	8.20	-128	9.55	54.1	
1245	13.47	2.5	8.23	-123	9.22	55.3	
1250	13.49	2.49	8.27	-121	9.28	53.1	
1255	13.52	2.49	8.31	-118	9.05	54.7	
1300	13.56	2.48	8.30	-121	9.49	57.3	
1305	13.60	2.48	8.35	-117	9.59	56.6	
1310	13.64	2.48	8.35	-117	9.11	55.7	
1315	13.64	2.48	8.33	-120	9.07	55.3	
1320	13.63	2.48	8.35	-121	8.9	57.8	
1325	13.63	2.48	8.31	-123	8.78	57.9	
1330	13.61	2.48	8.31	-123	8.31	60.1	
1335	13.56	2.5	8.29	-124	8.5	60.3	
1340	13.52	2.5	8.3	-123	8.33	58.8	
1345	13.77	2.47	8.33	-124	9.31	60.9	
1350	13.7	2.48	8.31	-123	9.35	58.4	
1355	13.72	2.48	8.32	-122	9.35	58.4	
1400	13.72	2.48	8.28	-125	8.85	59.3	
1405	13.7	2.48	8.3	-123	8.83	60.9	
1410	13.67	2.49	8.29	-124	8.7	60.4	
1415	13.65	2.48	8.31	-123	8.74	61.8	
1420	13.62	2.47	8.34	-121	8.81	65	
1425	13.62	2.49	8.26	-122	8.73	63.8	3 gal

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 11/17/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-7
PID Reading: 0.0 ppm

Depth to well water: 10.65 ft
Depth to well bottom: 28.5 ft.
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 4 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1245	12.7	0.929	6.37	-69	20.95	30.4	
1250	13.05	0.918	6.31	-66	10.000	28.8	
1255	13.34	0.908	6.28	-68	4.21	26	
1300	13.51	0.902	6.24	-67	3.02	20.2	
1305	13.62	0.898	61.9	-63	2.25	17.8	
1310	13.67	0.895	6.15	-59	2.01	17.3	
1315	13.66	0.892	6.13	-56	1.77	15.6	
1320	13.75	0.891	6.09	-52	1.49	14	
1325	13.76	0.887	6.05	-47	1.18	13.2	
1330	13.66	0.884	6.03	-44	1.01	12.4	
1335	13.7	0.882	6.01	-42	1	12.2	
1340	13.7	0.879	5.99	-40	0.91	11.1	
1345	13.66	0.876	5.97	-36	0.68	10.5	
1350	13.62	0.874	5.95	-34	0.56	10.1	
1355	13.71	0.871	5.92	-31	0.49	9.5	
1400	13.61	0.866	5.89	-27	0.31	8.6	2 gallons
1405	13.53	0.865	5.85	-23	0.2	8.7	
1410	13.56	0.863	5.84	-21	0.28	7	
1415	13.56	0.862	5.84	-21	0.32	7.6	
1420	13.52	0.86	5.82	-19	0.19	7	
1425	12.38	0.9	8.42	-57	11.93	68.4	
1425	12.33	0.9	8.41	-45	11.98	65.1	
1430	12.32	0.901	8.42	-42	11.92	67.5	
1435	12.32	0.904	8.43	-36	11.86	65.3	
1440	12.18	0.908	8.43	-33	12.1	66.5	
1445	12.28	0.909	8.43	-29	12.31	65.2	
1450	12.3	0.909	8.44	-22	12.03	68.7	
1455	12.21	0.913	8.46	-25	11.97	69.1	
1500	12.21	0.914	8.47	-26	11.95	69.2	
1505	12.21	0.916	8.5	-26	12	69.5	2 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 12/5/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-8
PID Reading : 0.0 ppm

Depth to well water: 5.3 ft
Depth to well bottom: 31 ft
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 5 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1020	10.73	0.282	6.13	195	25.92	1000+	
1025	11.12	0.278	6.09	201	24.180	1000+	
1030	11.95	0.269	6.13	210	22.18	1000+	
1035	8.75	0.003	6.20	215	15.06	1000+	
1040	8.35	0.003	6.29	-10	14.4	1000+	
1045	8.46	0.003	6.15	-3	13.04	1000+	
1050	8.69	0.003	6.2	-5	12.75	1000+	
1055	8.7	0.003	6.22	-5	12.73	1000+	
1100	8.72	0.003	6.22	-5	12.22	1000+	
1105	8.73	0.003	6.22	-5	12.7	1000+	
1110	8.77	0.003	6.22	218	12.66	1000+	
1115	8.71	0.003	6.01	214	12.81	1000+	
1120	9.55	0.002	6.44	207	12.71	1000+	
1125	9.59	0.002	6.45	207	12.8	1000+	
1130	9.61	0.002	6.45	207	12.84	1000+	2.5 gallons
1135	10.51	0.003	5.17	237	16.53	1000+	
1140	10.51	0.003	5.23	236	15.8	1000+	
1145	10.55	0.003	5.27	235	14.08	1000+	
1150	10.57	0.003	5.34	234	13.26	1000+	
1155	10.8	0.002	5.5	228	11.43	1000+	
1200	12.15	0.002	6.38	217	12.55	1000+	
1205	11.41	0.002	5.26	280	10.87	1000+	
1210	11.38	0.002	5.28	280	10.6	1000+	
1215	11.04	0.002	5.63	266	10.24	1000+	
1220	1102	0.002	5.69	263	10.21	1000+	
1225	10.94	0.002	5.7	257	10.44	1000+	
1230	10.81	0.002	5.53	278	10.45	1000+	
1235	10.77	0.002	5.58	268	10.47	1000+	
1240	10.75	0.002	5.6	267	10.42	1000+	2.5 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 12/5/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-9
PID Reading 0.0 ppm

Depth to well water: 22.4 ft
Depth to well bottom: 51 ft
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 4 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1540	17.41	0.702	8	57	3.95	1000+	
1545	17.19	0.628	7.8	42	3.520	1000+	
1550	16.69	0.0000	7.67	45	9.67	1000+	
1555	16.56	0.000	7.69	45	9.69	1000+	
1600	16.07	0	7.55	42	9.62	1000+	
1605	15.86	0.179	7.90	41	9.01	1000+	
1610	15.56	0	7.67	37	9.71	1000+	
1615	11.61	0.873	7.02	46	7.16	1000+	
1620	12.63	0.001	7.69	28	10.33	1000+	
1625	11.62	0.866	6.98	51	8.11	1000+	1.5 gallons
1630	11.62	0.001	7.68	29	11.34	882	
1635	11.51	0	7.8	34	11.27	882	
1640	11.35	0.001	7.33	43	11.44	1000	
1645	11.1	0.002	7.49	52	11.53	1000	
1650	10.95	0.002	7.49	52	11.53	1000	
1655	10.88	0.002	7.55	48	11.54	1000	
1700	10.83	0.002	7.59	47	11.56	1000+	
1705	10.79	0.002	7.66	45	11.57	1000	
1710	10.61	0.001	7.39	55	11.68	1000	
1715	11.03	0.852	7.28	47	10.67	1000	2.5 gallons
1720	10.89	0.853	7.27	54	9.92	1000+	
1725	10.09	0.002	7.49	50	11.81	1000+	
1730	9.97	0.001	7.58	45	11.8	1000+	
1735	9.72	0.001	7.72	31	11.65	1000+	
1740	9.42	0.001	7.82	32	11.79	1000+	
1745	9.34	0.001	7.87	31	11.77	1000+	
1750	9.29	0.001	7.91	31	11.78	1000+	1 gallon

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 12/6/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-10
PID Reading 0.0 ppm

Depth to well water: 13 ft
Depth to well bottom: 42 ft
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 3 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1000	9.96	0.002	9.53	86	23.19	1000+	
1005	9.98	0.002	9.45	88	15.14	1000+	
1010	10.01	0.0020	9.39	94	12.45	1000+	
1015	10.05	0.002	9.35	97	10.83	1000+	
1020	10.08	0.002	9.28	100	9.92	1000+	
1025	10.02	0.002	9.19	103	9.42	1000+	
1030	10.03	0.002	9.11	108	8.72	1000+	
1035	10.01	0.002	9.05	110	8.99	1000+	
1040	9.97	0.002	9	112	8.97	1000+	
1045	9.87	0.002	8.95	115	9.19	1000+	
1050	9.84	0.002	8.88	117	9.21	1000+	
1055	9.78	0.002	8.83	119	9.27	1000+	
1100	9.69	0.002	8.79	116	9.26	1000+	
1105	9.58	0.002	8.69	119	9.38	1000+	
1110	9.19	0.003	9.19	101	9.26	1000+	
1115	9.24	0.003	9.13	104	9.34	1000+	
1120	9.23	0.003	9.12	105	9.37	1000+	
1125	9.14	0.003	9.06	109	9.41	1000+	
1130	9.06	0.003	9.02	112	9.48	1000+	
1135	Pump Issue - Slow Recharge - No Data 1135 to 1205						
1210	8.68	0.003	8.82	123	9.67	1000+	
1215	9.34	1.77	7.05	190	13.77	1000+	
1220	11.64	1.67	6.5	190	10.82	1000+	
1225	11.4	1.68	6.48	174	12.55	1000+	
1230	12.08	1.48	6.47	148	15.3	1000+	
1235	12.30	1.66	6.46	133	11.67	1000+	
1240	12.55	1.66	6.49	123	14.14	1000+	
1245	12.83	1.64	6.5	115	11.9	1000+	
1250	12.95	1.64	6.5	113	12.54	1000+	
1255	12.91	1.64	6.5	113	13.33	1000+	3 gallons

Crawford & Associates Engineering, and Land Surveying, P.C.

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Date: 12/6/22
Field Personnel: MP/ KP
Monitoring Well No.: MW-11
PID Reading 0.0 ppm

Depth to well water: 72 ft
Depth to well bottom: 92.9 ft
Purging Device (pump type): QEDMP50 & Bladder pump
Purged Volume: 3.5 gallons

Time 24 Hour	Temp C	Specific Conductivity uS/CM	pH	ORP mv	DO mg/L	Turbidty NTU	Comments
1415	10.13	0.004	8.19	145	11.23	255	
1420	10.13	0.003	8.19	145	10.92	258	
1425	10.11	0.003	8.23	142	10.34	261	
1430	10.06	0.003	8.25	139	10.1	260	
1435	10.01	2.47	10.77	21	8.17	51.4	
1440	10.22	2.43	10.86	-1	8.56	49.8	
1445	10.28	2.37	10.94	-6	8.89	30.2	
1450	10.23	2.38	10.87	-2	7.91	29.7	
1455	10.16	2.37	10.82	1	8.07	31.5	
1500	10.18	2.35	10.8	1	7.71	18.2	
1505	10.19	2.34	10.76	4	7.76	15.5	
1510	10.17	2.31	10.68	7	7.69	15.6	
1515	10.14	2.3	10.63	9	7.7	15.1	
1520	10.1	2.28	10.56	13	7.77	15.5	
1525	10.05	2.24	10.49	16	7.56	14.3	
1530	10.01	2.2	10.37	18	7.58	18.1	
1535	9.98	2.17	10.27	22	7.77	16.2	
1540	9.95	2.15	9.95	26	7.66	18.4	
1545	9.88	2.13	10.09	27	7.27	15.4	
1550	9.84	2.12	9.96	32	7.4	18.4	
1555	9.8	2.08	9.7	37	7.29	20.4	
1600	9.78	2.08	9.78	38	7.53	20.5	
1605	9.67	2.07	9.55	43	7.9	26.8	
1610	9.63	2.06	9.54	44	7.23	27.6	
1615	9.63	2.06	9.52	43	7.48	28.3	3.5 gallons

APPENDIX F: 2022 LEACHATE SUMP SAMPLING RESULTS

CRAWFORD & ASSOCIATES ENGINEERING, P.C.

POST LANDFILL CLOSURE MONITORING
TABLE 1: FIELD OBSERVATIONS

SAMPLE ID	DATE	Gradient	PARAMETER	SPECIFIC CONDUCTANCE UMHOS/CM@25 DEGREE C	TEMPERATURE DEGREE C	pH	eH	TURBIDITY (NTU)	TOTAL KJELDAHL NITROGEN	AMMONIA	NITRATE	CHEMICAL OXYGEN DEMAND	BICHEMICAL OXYGEN DEMAND	TOTAL ORGANIC CARBON	TOTAL DISSOLVED SOLIDS	SULFATE	ALKALINITY mg/L@CaCO3	CHLORIDE	TOTAL PHENOLS	TOTAL HARDNESS mg/l@CaCO3	COLOR	TOTAL CYANIDE
			TOGS/PART 701/703 GUIDANCE LEVEL D	NE	NE	6.0-9.5	NE	NE	NE	0.095	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	9
LEACHATE SUMP - SURFICIAL SYSTEM	2022 JUNE	DOWNGRADIENT		---	---	---	---	33.3	13.3	10.70	2.03	32	<4	8.6	720	5.2	438	256	<0.015	---	20	<0.01

Notes:
Guidance levels based on NYSDEC Division of Water TOGS 1.1.1 (June 1998) and subsequent NYSDEC Memoranda and 6NYCRR Part 701/ 703 Groundwater Standards for Class D or GA Waters
Blue, bold and shaded indicates exceedance of applicable regulatory criteria
Green shaded indicates laboratory method detection limit exceeds guidance value (GV)
---No Data (Inaccessible/Not Sampled)
All results in mg/L unless otherwise noted.
NE - Not Established NA - Not Analyzed
Residential Well Analysis Limited to : TDS, Alkalinity, Chloride, Ammonia, Barium, Iron, Manganese & Sodium
Monitoring Wells and Surface Water Samples Analyzed for 1993 Landfill Baseline Parameters
*Sample Collected from Outside Spigot Which is After Treatment System Per Owner/Resident

POST LANDFILL CLOSURE MONITORING
TABLE 2: METALS

SAMPLE ID	DATE	GRADIENT	PARAMETER	ALUMINUM	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	BORON	BROMIDE	CADMIUM	CALCIUM	CHROMIUM	HEXAVALENT CHROMIUM	COBALT	COPPER	IRON	LEAD	MERCURY	MANGANESE	MAGNESIUM	NICKEL	POTASSIUM	SELENIUM	SILVER	SODIUM	THALLIUM	VANADIUM	ZINC
			TOGS PART 701/703 GUIDANCE LEVEL D	NE	NE	0.34	NE	NE	NE	NE	0.03	NE	3.00	NA	0.11	0.04	0.3	0.21	0.0000007	NE	NE	0.99	NE	NE	0.05	NE	0.02	0.19	0.97
LEACHATE SUMP - SURFICIAL SYSTEM	2022 JUNE	DOWNGRADIENT		0.305	<0.003	<0.004	0.469	<0.001	0.03	<1	<0.001	110	<0.001	<0.01	<0.002	<0.005	0.79	0.003	<0.0002	1.4	32.2	0.003	14.6	<0.01	<0.001	154	<0.0005	<0.002	0.031

Notes:
Guidance levels based on NYSDEC Division of Water TOGS 1.1.1 (June 1998) and subsequent NYSDEC Memoranda and 6NYCRR Part 701/ 703 Groundwater Standards for Class D or GA Waters
Blue, bold and shaded indicates exceedance of applicable regulatory criteria
Green shaded indicates laboratory method detection limit exceeds guidance value (GV)
---No Data (Inaccessible/Not Sampled)
All results in mg/L unless otherwise noted.
NE - Not Established NA - Not Analyzed
Residential Well Analysis Limited to : TDS, Alkalinity, Chloride, Ammonia, Barium, Iron, Manganese & Sodium
Monitoring Wells and Surface Water Samples Analyzed for 1993 Landfill Baseline Parameters
*Sample Collected from Outside Spigot Which is After Treatment System Per Owner/Resident

APPENDIX G: DATA SUMMARY TABLES

Crawford & Associates Engineering & Land Surveying, P.C.

Table 1: Groundwater – PFAS Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
PFOA & PFOS By EPA 537.1M														
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE	<1.79	<1.89	5.66	<2.08	<1.92	<1.92	2.01	<1.85	---	<1.85	<1.92	<1.92
Perfluorohexanoic acid (PFHxA)	ng/L	NE	<1.79	4.77	32.2	4.26	9.96	11.3	11.1	<1.85	---	7.62	3.82	<1.92
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	<1.79	3.48	35.6	3.32	<1.92	1.99	2.41	<1.85	---	<1.85	<1.92	<1.92
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	<1.79	2.03	14.1	4.37	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92	<1.92
Perfluorooctanoic acid (PFOA)	ng/L	6.7	2.45	**11.3**	**147**	8.98	3.39	3.87	<1.92	1.86	---	2.44	2.3	<1.92
Perfluorooctanesulfonic acid (PFOS)	ng/L	2.7	<1.79	**7.38**	**286**	**19.9**	**4.25**	**3.14**	2.23	<1.85	---	**5.89**	<1.92	<1.92
Perfluorononanoic acid (PFNA)	ng/L	NE	<1.79	<1.89	4.24	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92	<1.92
Perfluorodecanoic acid (PFDA)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92	<1.92
Perfluoroundecanoic acid (PFUnA)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluorododecanoic acid (PFDoA)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluorotridecanoic acid (PFTrDA)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluorotetradecanoic acid (PFTA)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85 (PF-CCV-L)	---	<1.85 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
N-MeFOSAA	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85 (PF-CCV-L)	---	<1.85 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
N-EtFOSAA	ng/L	NE	<1.79	<1.89 (PF-CCV-L)	2.35 (PF-CCV-L)	<2.08	<1.92	<1.92	<1.92	<1.85 (PF-CCV-L)	---	<1.85 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluoropentanoic acid (PFPeA)	ng/L	NE	3.2	3.7	24.1	4.42	6.07	10.1	6.18	<1.85	---	6.28	<1.92	<1.92
Perfluoro-1-octanesulfonamide (FOSA)	ng/L	NE	<1.79	<1.89 (PF-CCV-L)	<1.89 (PF-CCV-L)	<2.08	<1.92	<1.92	<1.92 (PF-CCV-L)	<1.85 (PF-CCV-L)	---	<1.85 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluoro-1-heptanesulfonic acid (PFHpS)	ng/L	NE	<1.79	<1.89	6.4	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92	<1.92
Perfluoro-1-decanesulfonic acid (PFDS)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85 (PF-CCV-L)	---	<1.85 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.92 (PF-CCV-L)
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	ng/L	NE	<4.46	<4.73	<4.73	<5.21	<24 (Dilution: 5)	<24 (Dilution: 5)	<4.81	4.63	---	<4.63	<4.81	<4.81
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	ng/L	NE	<1.79	<1.89	<1.89	<2.08	<1.92	<1.92	<1.92	<1.85	---	<1.85	<1.92	<1.92
Perfluoro-n-butanoic (PFBA)	ng/L	NE	5.15	4.96	19.9	<2.08	8.47	<1.92	7.21	<1.85	---	<1.85	<1.92	<1.92

Notes:

Units:
All results provided in ng/L [parts per trillion (ppt)]

Guidance Values:
NYSDEC 2023 Addendum to June 1998 Division of Water Technical and Operational Guidance Series (TOGs) No. 1.1.1, and subsequent memoranda

Highlighting:
Bold and red highlighting indicates that the result exceeds the established guidance value.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
PF-CCV-L: The CCV recovery was slightly below acceptable limits for the qualified compound. However, sample results are not biased low because results are corrected for isotope recovery.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 2: Groundwater – Volatile Organic Compound Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/15/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/17/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
Volatiles By EPA 8260 / 5030B														
1,1,1,2-Tetrachloroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1,1-Trichloroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1,2,2-Tetrachloroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1,2-Trichloroethane	ug/L	1	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2,2-Trichlorotrifluoroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1-Dichloroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1-Dichloroethylene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,1-Dichloropropene	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
1,2,3-Trichlorobenzene	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2,3-Trichloropropane	ug/L	0.04	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2,4-Trichlorobenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2,4-Trimethylbenzene	ug/L	5	<0.2	---	---	---	---	---	0.32 (J)	<0.2	<0.2	---	---	---
1,2-Dibromo-3 chloropropane	ug/L	0.04	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2 Dibromoethane (Ethylene Dibromide)	ug/L	0.0006	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2-Dichlorobenzene	ug/L	3	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2-Dichloroethane	ug/L	0.6	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,2-Dichloropropane	ug/L	1	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,3,5-Trimethylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,3-Dichlorobenzene	ug/L	3	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,3-Dichloropropane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
1,4-Dichlorobenzene	ug/L	3	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
2-Butanone (Methyl Ethyle Ketone)	ug/L	50	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
2-Hexanone	ug/L	50	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
4 Methyl-2-pentanone (Metyl Isobutly Ketone)	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Acetone	ug/L	50	<1	---	---	---	---	---	<1	1.4 (J)	1.27 (J)	---	---	---
Acrolein	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Acrylonitrile	ug/L	0.07	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
2,2-Dichloropropane	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
2-Chlorotoluene	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
4-Chlorotoluene	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Benzene	ug/L	1	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Bromobenzene	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Bromochloromethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Bromodichloromethane	ug/L	50	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Bromoform	ug/L	50	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Bromomethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2 (CCVE, QL-02)	<0.2 (CCVE, QL-02)	---	---	---
Carbon disulfide	ug/L	60	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Carbon tetrachloride	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Chlorobenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Chloroethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Chloroform	ug/L	7	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Chloromethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
cis-1,2-Dichloroethylene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
cis-1,3-Dichloropropylene	ug/L	0.4	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Cyclohexane	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2 (QL-02)	<0.2 (QL-02)	---	---	---
Dibromochloromethane	ug/L	50	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Dibromomethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Dichlorodifluoromethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Ethylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Hexachlorobutadiene	ug/L	0.5	<0.2	---	---	---	---	---	<0.2	<0.2 (CCVE, QL-02)	<0.2 (CCVE, QL-02)	---	---	---
Isopropylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Methyl acetate	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Methlycyclohexane	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Methyl t-butyl ether (MTBE)	ug/L	10	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Methylene chloride	ug/L	5	<1	---	---	---	---	---	<1	<1	<1	---	---	---
Naphthalene	ug/L	10	<1	---	---	---	---	---	<1	<1	<1	---	---	---
n-Butylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
n-Propylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
o-Xylene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
m&p-Xylene	ug/L	5	<0.5	---	---	---	---	---	<0.5	<0.5	<0.5	---	---	---
*p-Diethylbenzene	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
*p-Ethyltoluene	ug/L	NE	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
p-Isopropyltoluene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
sec-Butylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Styrene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
tert butyl alcohol (TBA)	ug/L	NE	<0.5	---	---	---	---	---	<0.5	<0.5	<0.5	---	---	---
tert-Butylbenzene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Tetrachloroethylene (PCE)	ug/L	5	1.17	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Toluene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Total 1,3-Dichloropropene	ug/L	0.4	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Total Trihalomethanes	ug/L	NE	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Total Xylenes	ug/L	5	<0.6	---	---	---	---	---	<0.6	<0.6	<0.6	---	---	---
trans-1,2-Dichloroethylene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
trans-1,3-Dichloropropylene	ug/L	0.4	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Trichloroethylene	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Trichlorofluoromethane	ug/L	5	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Vinyl chloride	ug/L	2	<0.2	---	---	---	---	---	<0.2	<0.2	<0.2	---	---	---
Tentatively Identified Compounds														
Tentatively Identified Compounds	ug/L	NE	None	---	---	---	---	---	None	None	None	---	---	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
CCVE: The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% difference for average Rf or >20% Drift for quadratic fit.)
QL-02: The LCS analyte is outside Laboratory Recovery limits due the analyte behavior using the referenced method. The referencemethod has certain limitations with respect to analytes of this nature.
J: Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC,the result is an estimated concentration.
* - Analyte is not certified or the state of the samples origination does not offer certification for the analyte.

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Crawford & Associates Engineering & Land Surveying, P.C.

Table 3: - Groundwater – Semi-Volatile Organic Compound Data Summary Table

Compound	Units	NYSDEC Guidance Value	Sample Collection Date Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
Semivolatiles By EPA 3510C / 3535A														
1,1-Biphenyl	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,2,4,5-Tetrachlorobenzene	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,2,4-Trichlorobenzene	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,2-Dichlorobenzene	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,2-Diphenylhydrazine	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,3-Dichlorobenzene	ug/L	3	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,4-Dichlorobenzene	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,3,4,6-Tetrachlorophenol	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4,5-Trichlorophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4,6-Trichlorophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4-Dichlorophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4-Dimethylphenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4-Dinitrophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,4-Dinitrotoluene	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2,6-Dinitrotoluene	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Chloronaphthalene	ug/L	10	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Chlorophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Methylnaphthalene	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Methylphenol (o-cresol)	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Nitroaniline	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
2-Nitrophenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
3&4-Methylphenol (m&p-cresol)	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
3,3'-Dichlorobenzidine	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
3-Nitroaniline	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4,6-Dinitro-2-methylphenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Bromophenyl phenyl ether	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Chloro-3-methylphenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Chloroaniline	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Chlorophenyl phenyl ether	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Nitroaniline	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
4-Nitrophenol	ug/L	1	<5.13	---	---	---	---	---	<5.71	<5	<5	---	---	---
Acenaphthene	ug/L	20	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Acenaphthylene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Acetophenone	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Aniline	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Anthracene	ug/L	50	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Atrazine	ug/L	3	<0.513	---	---	---	---	---	<0.571	<0.5	<0.5	---	---	---
Benzaldehyde	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.51	---	---	---
Benzidine	ug/L	5	<5.13	---	---	---	---	---	<5.71	<5	<5	---	---	---
Benz(a)anthracene	ug/L	0.002	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Benzo(a)pyrene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Benzo(b)fluoranthene	ug/L	0.002	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Benzo(ghi)perylene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Benzo(k)fluoranthene	ug/L	0.002	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Benzoic acid	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Benzyl alcohol	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Benzyl butyl phthalate	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Bis(2-chloroethoxy)methane	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Bis(2-chloroethyl)ether	ug/L	1	<1.03	---	---	---	---	---	<1.14	<1	<1	---	---	---
Bis(2-chloroisopropyl)ether	ug/L	5	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Bis(2-ethylhexyl)phthalate	ug/L	5	<0.513	---	---	---	---	---	1.20 (B)	<0.5	0.52	---	---	---
Caprolactum	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Chrysene	ug/L	0.002	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Carbazole	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Dibenzofuran	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Dibenzo(a,h) anthracene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Diethyl phthalate	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Dimethylphthalate	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Di-n-butylphthalate	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Di-n-octylphthalate	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Fluoranthene	ug/L	50	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Fluorene	ug/L	50	0.174	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Hexachlorobenzene	ug/L	0.04	<0.0205	---	---	---	---	---	<0.0229	<0.02	<0.02	---	---	---
Hexachlorobutadiene	ug/L	0.5	<0.513	---	---	---	---	---	<0.571	<0.5	<0.5	---	---	---
Hexachlorocyclopentadiene	ug/L	5	<5.13	---	---	---	---	---	<5.71	<5.00	<5	---	---	---
Naphthalene	ug/L	10	0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Nitrobenzene	ug/L	0.4	<0.256	---	---	---	---	---	<0.286	<0.25	<0.25	---	---	---
Hexachloroethane	ug/L	5	<0.513	---	---	---	---	---	<0.571	<0.5	<0.5	---	---	---
Indeno(1,2,3-cd)pyrene	ug/L	0.002	<0.0513	---	---	---	---	---	<0.0571	<0.05	<0.05	---	---	---
Isophorone	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
N-Nitrosodi-n-propylamine	ug/L	NE	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
N-Nitrosodiphenylamine	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
Pentachloronitrobenzene	ug/L	NE	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Pyridine	ug/L	50	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5			
Phenol	ug/L	1	<2.56	---	---	---	---	---	<2.86	<2.5	<2.5	---	---	---
1,4-Dioxane	ug/L	0.35	<0.3	---	---	---	**1.57**	**1.63**	---	<0.3	---	---	---	---
Pentachlorophenol	ug/L	NE	<0.256	---	---	---	---	---	<0.286	<0.250	<0.250	---	---	---
Phenanthrene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.0500	<0.0500	---	---	---
Pyrene	ug/L	NE	<0.0513	---	---	---	---	---	<0.0571	<0.0500	<0.0500	---	---	---
Tentatively Identified Compounds														
Tridecane RT 7.0	ug/L	NE	11.5 (N, J)	---	---	---	---	---	None	None	None	---	---	---

Notes:

Units:
All results provided in ug/L [parts per million (ppm)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the established guidance value.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
N -The tentaively identified compound reported indicates the presence of a possile analyte or class of analyte that has been "tentatively identified" and the associated numerical value represents its estimated concentration.
J - Detected below the reporting limit but greater than or equal to the method detection limit or in the case of a TIC, the result is an estimated concentration.
B - Analyte is found in the associated batch blank.

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Table 4: Groundwater – Metals and Cyanide Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
Target Analyte List Metals via EPA 3015A / SW846-7470A														
Aluminum	mg/L	2	0.286	---	---	---	---	---	<0.00556	**10.4**	**9.34**	---	---	---
Antimony	mg/L	0.003	<0.028	---	---	---	---	---	<0.00125	<0.00111	<0.00111	---	---	---
Arsenic	mg/L	0.025	<0.017	---	---	---	---	---	0.0148	0.00234	0.00517	---	---	---
Beryllium	mg/L	0.003	<0.0006	---	---	---	---	---	<0.000375	<0.000333	<0.000333	---	---	---
Barium	mg/L	1	<0.028	---	---	---	---	---	0.0985	0.0869	0.0751	---	---	---
Cadmium	mg/L	0.005	<0.003	---	---	---	---	---	<0.000625	<0.000556	<0.000556	---	---	---
Calcium	mg/L	NE	13.1 (B)	---	---	---	---	---	116 (B)	15.6	15.6	---	---	---
Chromium, Total	mg/L	0.05	<0.006	---	---	---	---	---	<0.00556	0.0178	0.0147	---	---	---
Cobalt	mg/L	NE	<0.004	---	---	---	---	---	<0.00444	0.0108	0.00825	---	---	---
Copper	mg/L	0.2	<0.022	---	---	---	---	---	<0.0222	0.0472	0.0369	---	---	---
Iron	mg/L	0.3	0.281	---	---	---	---	---	**10.5**	**21.8**	**18.7**	---	---	---
Lead	mg/L	0.025	<0.006	---	---	---	---	---	<0.0056	**0.0266**	0.0223	---	---	---
Magnesium	mg/L	35	2.89	---	---	---	---	---	32.5	6.41	6.05	---	---	---
Manganese	mg/L	0.3	**0.387**	---	---	---	---	---	**4.08**	**0.833**	**0.753**	---	---	---
Mercury	mg/L	0.0007	<0.0002	---	---	---	---	---	<0.0002	<0.0002	<0.0002	---	---	---
Nickel	mg/L	0.1	<0.011	---	---	---	---	---	<0.0111	0.0284	0.0253	---	---	---
Potassium	mg/L	NE	0.478	---	---	---	---	---	6.47	2.65 (B)	2.60 (B)	---	---	---
Selenium	mg/L	0.01	<0.028	---	---	---	---	---	0.00131	0.00205	0.00377	---	---	---
Silver	mg/L	0.05	<0.006	---	---	---	---	---	<0.0056	<0.00556	<0.005	---	---	---
Thallium	mg/L	0.0005	<0.028	---	---	---	---	---	<0.00125	<0.00111	<0.00111	---	---	---
Sodium	mg/L	20	9.77	---	---	---	---	---	**27.1**	**25.8 (B)**	**26.2 (B)**	---	---	---
Vanadium	mg/L	NE	<0.011	---	---	---	---	---	<0.0111	0.0132	0.0123	---	---	---
Zinc	mg/L	5	0.031	---	---	---	---	---	0.0333	0.0957	0.0857	---	---	---
Cyanide														
Cyanide	mg/L	0.2	<0.01	---	---	---	---	---	<0.01	<0.01	<0.01	---	---	---

Notes:

Units:
All results provided in mg/L [parts per million (ppm)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
B: Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants.

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Table 5: Groundwater – PCBs Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
PCBs By EPA SW846-3510C Low Level														
PCB-1016	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1221	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1232	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1242	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1248	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1254	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1260	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
Total PCBs	ug/L	0.09	<0.0541	---	---	---	---	---	<0.0541	<0.05	<0.0588	---	---	---
PCB-1262	ug/L	NE	NA	---	---	---	---	---	NA	NA	NA	---	---	---
PCB-1268	ug/L	NE	NA	---	---	---	---	---	NA	NA	NA	---	---	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 6: Groundwater – Herbicides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
Chlorinated Herbicides By SW8151A														
2,4,5-T	ug/L	35	<5	---	---	---	---	---	<5	<5	<5	---	---	---
2,4,5-TP (Silvex)	ug/L	0.26	<5	---	---	---	---	---	<5	<5	<5	---	---	---
2,4-D	ug/L	50	<5	---	---	---	---	---	<5	<5	<5	---	---	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 7: Groundwater – Pesticides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification											
			11/8/2022 MW-1	11/8/2022 MW-3	11/8/2022 MW-4	11/8/2022 MW-5	11/8/2022 MW-6A	11/8/2022 MW-6A Duplicate	11/9/2022 MW-7	11/9/2022 MW-8	11/8/2022 MW-8 Duplicate	11/9/2022 MW-9	11/9/2022 MW-10	11/9/2022 MW-11
Pesticides By EPA SW846-3510C Low Level														
4,4' -DDD	ug/L	0.3	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
4,4' -DDE	ug/L	0.2	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
4,4' -DDT	ug/L	0.2	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Aldrin	ug/L	NE	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
alpha-BHC	ug/L	0.01	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Alachlor	ug/L	0.5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
alpha-Chlordane	ug/L	0.05	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Chlordane	ug/L	0.05	---	---	---	---	---	---	---	---	---	---	---	---
beta-BHC	ug/L	0.04	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
delta-BHC	ug/L	0.04	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Dieldrin	ug/L	0.004	<0.00216	---	---	---	---	---	<0.00216	<0.002	<0.00235	---	---	---
Endosulfan I	ug/L	NE	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Endosulfan II	ug/L	NE	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Endosulfan Sulfate	ug/L	NE	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Endrin	ug/L	NE	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Endrin Aldehyde	ug/L	5	<0.0108	---	---	---	---	---	<0.0108	<0.0100	<0.0118	---	---	---
Endrin ketone	ug/L	5	<0.0108	---	---	---	---	---	<0.0108	<0.0100	<0.0118	---	---	---
gama-BHC (Lindane)	ug/L	0.05	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
gama-Chlordane	ug/L	0.05	<0.0108	---	---	---	---	---	<0.0108	<0.0100	<0.0118	---	---	---
Heptachlor	ug/L	0.04	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Heptachlor epoxide	ug/L	0.03	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Hexachlorobenzene	ug/L	0.04	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Hexachlorocyclopentadiene	ug/L	5	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Lindane	ug/L	0.05	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Methoxychlor	ug/L	35	<0.00432	---	---	---	---	---	<0.00432	<0.00400	<0.00471	---	---	---
Propachlor	ug/L	35	NA	---	---	---	---	---	NA	NA	NA	---	---	---
Toxaphene	ug/L	0.06	<0.108	---	---	---	---	---	<0.108	<0.100	<0.118	---	---	---
Chlordane, total (alpha, gama)	ug/L	0.05	<0.0108	---	---	---	---	---	<0.0108	<0.200	<0.235	---	---	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 8: Surface Water & Leachate Sump – PFAS Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
PFOA & PFOS By EPA 537.1M									
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE	<2	<2	<1.89	2.1	<1.89	2.83	3.73
Perfluorohexanoic acid (PFHxA)	ng/L	NE	<2	6.74	8.33	5.75	<1.89	6.84	25.5
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	<2	5.66	5.78	5.73	2.25	5.18	22.6
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	<2	2.83	3.78	2.54	<1.89	<2	15.5
Perfluorooctanoic acid (PFOA)	ng/L	6.7	4.74	**15.4**	**20.9**	**15.5**	5.69	**7.89**	**81.6**
Perfluorooctanesulfonic acid (PFOS)	ng/L	2.7	**4.83**	**40.3**	**49**	**18.9**	**9.4**	**2.83**	**192**
Perfluorononanoic acid (PFNA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	3.24
Perfluorodecanoic acid (PFDA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	<1.85
Perfluoroundecanoic acid (PFUnA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	2.37
Perfluorododecanoic acid (PFDoA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	<1.85
Perfluorotridecanoic acid (PFTrDA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	<1.85
Perfluorotetradecanoic acid (PFTA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	<1.85
N-MeFOSAA	ng/L	NE	<2 (PF-CCV-L)	<2 (PF-CCV-L)	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.89 (PF-CCV-L)	<2 (PF-CCV-L)	<1.85 (PF-CCV-L)
N-EtFOSAA	ng/L	NE	<2 (PF-CCV-L)	3.98 (PF-CCV-L)	5.56 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.89 (PF-CCV-L)	<2 (PF-CCV-L)	45.6 (PF-CCV-L)
Perfluoropentanoic acid (PFPeA)	ng/L	NE	<2	4.92	4.93	4.14	2.58	7.17	12.7
Perfluoro-1-octanesulfonamide (FOSA)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	2.67
Perfluoro-1-heptanesulfonic acid (PFHpS)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	4.96
Perfluoro-1-decanesulfonic acid (PFDS)	ng/L	NE	<2	<2	<1.89	<1.92	<1.89	<2	<1.85
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	ng/L	NE	<5	<5	<4.73	<4.81	<23.7	<5	<23.1
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	ng/L	NE	<2 (PF-CCV-L)	<2	<1.89 (PF-CCV-L)	<1.92	<1.89	<2	<9.26
Perfluoro-n-butanoic (PFBA)	ng/L	NE	2.69	6.38	6.56	5.77	4.54	11.2	19.4

Notes:

Units:
All results provided in ng/L [parts per trillion (ppt)]

Guidance Values:
NYSDEC 2023 Addendum to June 1998 Division of Water Technical and Operational Guidance Series (TOGs) No. 1.1.1, and subsequent memoranda

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
PF-CCV-L: The CCV recovery was slightly below acceptable limits for the qualified compound. However, sample results are not biased low because results are corrected for isotope recovery.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 9 : Surface Water & Leachate Sump – Volatile Organic Compound Data Summary Table

Compound	Units	Guidance Value	11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
Volatiles By EPA 5030B									
1,1,1,2-Tetrachloroethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1,1-Trichloroethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1,2,2-Tetrachloroethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1,2-Trichloroethane	ug/L	1	---	<0.2	<0.2	---	---	<0.2	---
Trichlorotrifluoroethane (Freon 113)	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloroethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloroethene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloropropene	ug/L	5	---	NA	NA	---	---	NA	---
1,2,3-Trichlorobenzene	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
1,2,3-Trichloropropane	ug/L	0.04	---	<0.2	<0.2	---	---	<0.2	---
1,2,4-Trichlorobenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,2,4-Trimethylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dibromo-3 chloropropane	ug/L	0.04	---	<0.2	<0.2	---	---	<0.2	---
1,2 Dibromoethane (Ethylene Dibromide)	ug/L	0.0006	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichlorobenzene	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichloroethane	ug/L	0.6	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichloropropane	ug/L	1	---	<0.2	<0.2	---	---	<0.2	---
1,3,5-Trimethylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,3-Dichlorobenzene	ug/L	3	---	<0.2	<0.2	---	---	<0.2	---
1,3-Dichloropropane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
1,4-Dichlorobenzene	ug/L	3	---	<0.2	<0.2	---	---	<0.2	---
2-Butanone (Methyl Ethyl Ketone)	ug/L	50	---	<0.2	<0.2	---	---	<0.2	---
2-Hexanone	ug/L	50	---	<0.2	<0.2	---	---	<0.2	---
4 Methyl-2-pentanone	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
Acetone	ug/L	50	---	3.6 (CCVE, ICVE)	3.96 (CCVE, ICVE)	---	---	5.91 (ICVE)	---
Acrolein	ug/L	5	---	0.22 (J, CCVE)	<0.2	---	---	0.93 (CCVE, ICVE)	---
Acrylonitrile	ug/L	0.07	---	<0.2	<0.2	---	---	<0.2	---
2,2-Dichloropropane	ug/L	5	---	NA	NA	---	---	NA	---
2-Chlorotoluene	ug/L	5	---	NA	NA	---	---	NA	---
4-Chlorotoluene	ug/L	5	---	NA	NA	---	---	NA	---
Benzene	ug/L	1	---	<0.2	<0.2	---	---	<0.2	---
Bromobenzene	ug/L	5	---	NA	NA	---	---	NA	---
Bromochloromethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Bromodichloromethane	ug/L	50	---	<0.2	<0.2	---	---	<0.2	---
Bromoform	ug/L	50	---	<0.2	<0.2	---	---	<0.2	---
Bromomethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Carbon disulfide	ug/L	60	---	<0.2	<0.2	---	---	0.61 (CCVE)	---
Carbon tetrachloride	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Chlorobenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Chloroethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Chloroform	ug/L	7	---	<0.2	<0.2	---	---	<0.2	---
Chloromethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
cis-1,2-Dichloroethene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
cis-1,3-Dichloropropene	ug/L	0.4	---	<0.2	<0.2	---	---	<0.2	---
Cyclohexane	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
Dibromochloromethane	ug/L	50	---	<0.2	<0.2	---	---	<0.2	---
Dibromomethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Dichlorodifluoromethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Ethylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Hexachlorobutadiene	ug/L	0.5	---	<0.2	<0.2	---	---	<0.2	---
Isopropylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Methyl acetate	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
Methlycyclohexane	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
Methyl t-butyl ether (MTBE)	ug/L	10	---	<0.2	<0.2	---	---	<0.2	---
Methylene chloride	ug/L	5	---	<1	<1	---	---	<1	---
Naphthalene	ug/L	10	---	<1	<1	---	---	<1	---
n-Butylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
n-Propylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
o-Xylene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
m&p-Xylene	ug/L	NE	---	<0.5	<0.5	---	---	<0.5	---
p-Diethylbenzene	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
p-Ethyltoluene	ug/L	NE	---	<0.2	<0.2	---	---	<0.2	---
p-Isopropyltoluene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
sec-Butylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Styrene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
tert butyl alcohol (TBA)	ug/L	NE	---	<0.5	<2.54 (CCVE, ICVE)	---	---	<0.5	---
tert-Butylbenzene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Tetrachloroethene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Toluene	ug/L	5	---	<0.2	<0.2	---	---	1.22	---
Total 1,3-Dichloropropene	ug/L	0.4	---	NA	NA	---	---	NA	---
Total Xylenes	ug/L	5	---	<0.6	<0.6	---	---	<0.6	---
trans-1,2-Dichloroethene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
trans-1,3-Dichloropropene	ug/L	0.4	---	<0.2	<0.2	---	---	<0.2	---
Trichloroethene	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Trichlorofluoromethane	ug/L	5	---	<0.2	<0.2	---	---	<0.2	---
Vinyl chloride	ug/L	2	---	<0.2	<0.2	---	---	<0.2	---
Tentatively Identified Compounds (TICS)									
TICS	ug/L	NE	---	None	None	---	---	None	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
CCVE: The value reported is estimated. The value is estimated due to its behavior during the continuing calibration verification.
J: Detected below the Reporting Limit but greater han or equal to the Method Detection Limit or in the case of a TIC, the result is an estimated concentration.
ICVE: The value reported is estimated. The value is estimate

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 10: Surface Water & Leachate Sump – Semi-Volatile

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
Semivolatiles By EPA 3510C / 3535A									
1,1-Biphenyl	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,2,4,5-Tetrachlorobenzene	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,2,4-Trichlorobenzene	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,2-Dichlorobenzene	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,2-Diphenylhydrazine	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,3-Dichlorobenzene	ug/L	3	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
1,4-Dichlorobenzene	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,3,4,6-Tetrachlorophenol	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4,5-Trichlorophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4,6-Trichlorophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4-Dichlorophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4-Dimethylphenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4-Dinitrophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,4-Dinitrotoluene	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2,6-Dinitrotoluene	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Chloronaphthalene	ug/L	10	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Chlorophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Methylnapththalene	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Methylphenol (o-cresol)	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Nitroaniline	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
2-Nitrophenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
3&4-Methylphenol (m&p-cresol)	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
3,3'-Dichlorobenzidine	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
3-Nitroaniline	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4,6-Dinitro-2-methylphenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Bromophenyl phenyl ether	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Chloro-3-methylphenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Chloroaniline	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Chlorophenyl phenyl ether	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Nitroaniline	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
4-Nitrophenol	ug/L	1	---	<6.67 (HT-01)	<6.67 (HT-01)	---	---	<2.94	---
Acenaphthene	ug/L	20	---	<0.0667	<0.0667 (HT-01R)	---	---	<0.0588	---
Acenaphthylene	ug/L	NE	---	<0.0667	<0.0667 (HT-01R)	---	---	<0.0588	---
Acetophenone	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Aniline	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Anthracene	ug/L	50	---	<0.0667	<0.0667 (HT-01R)	---	---	<0.0588	---
Atrazine	ug/L	3	---	<0.667	<0.667 (HT-01R)	---	---	<0.588	---
Benzaldehyde	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Benzidine	ug/L	5	---	<6.67 (HT-01)	<6.67 (HT-01)	---	---	<5.88	---
Benz(a)anthracene	ug/L	0.002	---	<0.0667	<0.0667 (HT-01R)	---	---	**0.0588**	---
Benzo(a)pyrene	ug/L	NE	---	<0.0667	<0.0667 (HT-01R)	---	---	0.0706	---
Benzo(b)fluoranthene	ug/L	0.002	---	<0.0667	<0.0667 (HT-01R)	---	---	**0.0588**	---
Benzo(ghi)perylene	ug/L	NE	---	<0.0667	<0.0667 (HT-01R)	---	---	<0.0588	---
Benzo(k)fluoranthene	ug/L	0.002	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Benzoic acid	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Benzyl alcohol	ug/L	NE	---	<3.33 (HT-01)	<3.33(HT-01)	---	---	<2.94	---
Benzyl butyl phthalate	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Bis(2-chloroethoxy)methane	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Bis(2-chloroethyl)ether	ug/L	1	---	<1.33 (HT-01)	<1.33 (HT-01)	---	---	<1.18	---
Bis(2-chloroisopropyl)ether	ug/L	5	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Bis(2-ethylhexyl)phthalate	ug/L	5	---	**11.4 (B, HT-01R)**	3.31 (B,HT-01R)	---	---	1.44 (B)	---
Caprolactum	ug/L	NE	---	<3.33 (HT-01)	<3.33(HT-01)	---	---	<2.94	---
Chrysene	ug/L	0.002	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Carbazole	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Dibenzofuran	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Dibenzo(a,h) anthracene	ug/L	NE	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Diethyl phthalate	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Dimethylphthalate	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Di-n-butylphthalate	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Di-n-octylphthalate	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Fluoranthene	ug/L	50	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	0.0706	---
Fluorene	ug/L	50	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Hexachlorobenzene	ug/L	0.04	---	<0.0267 (HT-01R)	<0.0267 (HT-01R)	---	---	<0.0235	---
Hexachlorobutadiene	ug/L	0.5	---	<0.667(HT-01R)	<0.667 (HT-01R)	---	---	<0.588	---
Hexachlorocyclopentadiene	ug/L	5	---	<6.67 (HT-01)	<6.67 (HT-01)	---	---	<5.88	---
Naphthalene	ug/L	10	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Nitrobenzene	ug/L	0.4	---	<0.333 (HT-01R)	<0.333 (HT-01R)	---	---	<0.294	---
Hexachloroethane	ug/L	5	---	<0.667 (HT-01R)	<0.667 (HT-01R)	---	---	<0.588	---
Indeno(1,2,3-cd)pyrene	ug/L	0.002	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Isophorone	ug/L	50	---	<3.33(HT-01)	<3.33 (HT-01)	---	---	<2.94	---
N-Nitrosodi-n-propylamine	ug/L	NE	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
N-Nitrosodiphenylamine	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Pentachloronitrobenzene	ug/L	NE	---	NA	NA	---	---	NA	---
Phenol	ug/L	1	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
Pyridine	ug/L	50	---	<3.33 (HT-01)	<3.33 (HT-01)	---	---	<2.94	---
N-Nitrosodimethylamine	ug/L	NE	---	<.667 (HT-01R)	<0.667 (HT-01R)	---	---	<0.588	---
1,4-Dioxane	ug/L	0.35	<0.3	**0.576**	**0.496**	**0.576**	<0.3	<0.3	**2.4**
Pentachlorophenol	ug/L	5	---	<0.333 (HT-01R)	<0.333 (HT-01R)	---	---	<0.294	---
Phenanthrene	ug/L	50	---	<0.0667(HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Pyrene	ug/L	50	---	<0.0667 (HT-01R)	<0.0667 (HT-01R)	---	---	<0.0588	---
Tentatively Identified Compounds									
Sulfur RT 12.6	ug/L	NE	---	6.47 (N, J)	None	---	---	None	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda &

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance value.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
HT-01: This result was reported from an analysis conducted outside of the EPA recommended holding time.
HT-01R: This flag indiaes that the sample was initially analyzed within recommended hold time and that a re-run was peformed outside of the hold time.
N: The tic reported indicates the presence of a possible analyte or class of analyte that has been "tentatively identified" and the associated numerical value represents its estimated concentration.
J: Detected below the reporting limit but greater than or equal to the method detection limit or in the case of a tic, the result isan estimated concentration.
B: Analyte found in the associated batch blank. For volatiles, methylene chloride and acetone are common laboratory contaminants.

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Table 11: Surface Water & Leachate Sump – Metals and Cyanide

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
Target Analyte List Metals									
Aluminum	mg/L	2	---	**2.19**	**8.21**	---	---	**23.8**	---
Antimony	mg/L	0.003	---	<0.00111	<0.0011	---	---	0.00113	---
Arsenic	mg/L	0.025	---	0.00395	0.0115	---	---	0.0245	---
Beryllium	mg/L	0.003	---	<0.00333	0.000576	---	---	0.00106	---
Barium	mg/L	1	---	0.121	0.201	---	---	0.288	---
Cadmium	mg/L	0.005	---	<0.000556	0.00072	---	---	0.00056	---
Calcium	mg/L	NE	---	59.7	66.8	---	---	121	---
Chromium, Total	mg/L	0.05	---	<0.00556	0.0126	---	---	0.0421	---
Chromium, Hexavalent	mg/L	0.05	---	NA	NA	---	---	NA	---
Cobalt	mg/L	0.005	---	<0.00444	**0.0118**	---	---	**0.0193**	---
Cyanide	mg/L	0.2		<0.01	<0.01	---	---	<0.01	---
Copper	mg/L	0.2	---	0.0222	0.0235	---	---	0.0521	---
Iron	mg/L	0.3	---	**7.2**	**26.1**	---	---	**65.4**	---
Lead	mg/L	0.025	---	0.0137	**0.039**	---	---	**0.0861**	---
Magnesium	mg/L	35	---	12.8	15	---	---	19.4	---
Manganese	mg/L	0.3	---	**1.01**	**1.85**	---	---	**1.41**	---
Mercury	mg/L	0.0007	---	<0.0002	<0.0002	---	---	<0.0002	---
Nickel	mg/L	0.1	---	<0.0111	0.0205	---	---	0.0689	---
Potassium	mg/L	NE	---	7.2	7.61	---	---	8.26	---
Selenium	mg/L	0.01	---	0.0012 (B)	0.00796 (B)	---	---	**0.0156 (B)**	---
Silver	mg/L	0.05	---	<0.00556	<0.00556	---	---	<0.00556	---
Thallium	mg/L	0.0005	---	<0.0011	<0.0011	---	---	<0.0011	---
Sodium	mg/L	20	---	**127**	**114**	---	---	**39**	---
Vanadium	mg/L	0.014	---	<0.0111	**0.0147**	---	---	**0.0812**	---
Zinc	mg/L	5	---	0.0789	0.18	---	---	0.259	---
Cyanide									
Cyanide	mg/L	27	---	<0.01	<0.01	---	---	<0.01	---

Notes:

Units:
All results provided in mg/L [parts per million(ppm)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a dtectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
B: Analyte is found in the associaed analysis batch blank. For volatiles, methylene chloride and aceone are common lab contaminants.

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Crawford & Associates Engineering & Land Surveying, P.C.

Table 12: Surface Water & Leachate Sump – PCBs Data Summary

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
PCBs By EPA SW846-3510C Low Level									
PCB-1016	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1221	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1232	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1242	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1248	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1254	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1260	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
Total PCBs	ug/L	0.09	---	<0.0556	<0.0556	---	---	<0.0541	---
PCB-1262	ug/L	0.09	---	NA	NA	---	---	NA	---
PCB-1268	ug/L	0.09	---	NA	NA	---	---	NA	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 13: Surface Water & Leachate Sump – Herbicides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
Chlorinated Herbicides By SW8151A									
2,4,5-T	ug/L	35	---	<5	<5	---	---	<5	---
2,4,5-TP (Silvex)	ug/L	0.26	---	<5	<5	---	---	<5	---
2,4-D	ug/L	50	---	<5	<5	---	---	<5	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 14: Surface Water & Leachate Sump – Pesticides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/8/2022 SS-1	11/8/2022 SS-3	11/8/2022 SS-3 Duplicate	11/8/2022 BR-SS	11/9/2022 SS-4	11/9/2022 SS-5	11/8/2022 Leachate Sump
Pesticides By 8081 / EPA SW846-3510C Low Level									
4,4' -DDD	ug/L	0.3	---	<0.00444	<0.00444	---	---	<0.00432	---
4,4' -DDE	ug/L	0.2	---	<0.00444	<0.00444	---	---	<0.00432	---
4,4' -DDT	ug/L	0.2	---	<0.00444	<0.00444	---	---	<0.00432	---
Aldrin	ug/L	NE	---	<0.00444	<0.00444	---	---	<0.00432	---
alpha-BHC	ug/L	0.01	---	<0.00444	<0.00444	---	---	<0.00432	---
Alachlor	ug/L	0.5	---	NA	NA	---	---	NA	---
alpha-Clordane	ug/L	0.5	---	<0.00444	<0.00444	---	---	<0.00432	---
beta-BHC	ug/L	0.04	---	<0.00444	<0.00444	---	---	<0.00432	---
delta-BHC	ug/L	0.04	---	<0.00444	<0.00444	---	---	<0.00432	---
Dieldrin	ug/L	0.004	---	<0.00222	<0.00222	---	---	<0.00216	---
Endosulfan I	ug/L	NE	---	<0.00444	<0.00444	---	---	<0.00432	---
Endosulfan II	ug/L	NE	---	<0.00444	<0.00444	---	---	<0.00432	---
Endosulfan Sulfate	ug/L	NE	---	<0.00444	<0.00444	---	---	<0.00432	---
Endrin	ug/L	NE	---	<0.00444	<0.00444	---	---	<0.00432	---
Endrin Aldehyde	ug/L	5	---	<0.0111	<0.0111	---	---	<0.0108	---
Endrin ketone	ug/L	5	---	<0.0111	<0.0111	---	---	<0.0108	---
gama-BHC (Lindane)	ug/L	0.05	---	<0.00444	<0.00444	---	---	<0.00432	---
gama-Chlordane	ug/L	0.5	---	<0.0111	<0.0111	---	---	<0.0108	---
Heptachlor	ug/L	0.04	---	<0.00444	<0.00444	---	---	<0.00432	---
Heptachlor epoxide	ug/L	0.03	---	<0.00444	<0.00444	---	---	<0.00432	---
Hexachlorobenzene	ug/L	0.04	---	NA	NA	---	---	NA	---
Hexachlorocyclopentadiene	ug/L	5	---	NA	NA	---	---	NA	---
Lindane	ug/L	0.05	---	NA	NA	---	---	NA	---
Methoxychlor	ug/L	35	---	<0.00444	<0.00444	---	---	<0.00432	---
Propachlor	ug/L	35	---	NA	NA	---	---	NA	---
Toxaphene	ug/L	0.06	---	<0.111	<0.111	---	---	<0.108	---
Chlordane, total (alpha, gama)	ug/L	0.5	---	<0.0111	<0.0111	---	---	<0.0108	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 15: Soil – PFAS Data Summary Table

Compound	Guidance Value	Sample Identification Collection Date 11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface* - 10')	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
PFAS By EPA 537M														
Perfluorobutanesulfonic acid (PFBS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluorohexanoic acid (PFHxA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoroheptanoic acid (PFHpA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluorohexanesulfonic acid (PFHxS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluorooctanoic acid (PFOA)	0.66	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	0.306	<0.257	<0.267	---
Perfluorooctanesulfonic acid (PFOS)	0.88	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	0.544	**1.79**	0.26	**1.61**	---
Perfluorononanoic acid (PFNA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluorodecanoic acid (PFDA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoroundecanoic acid (PFUnA)	NE	0.338	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	0.376	<0.257	<0.267	---
Perfluorododecanoic acid (PFDoA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluorotridecanoic acid (PFTrDA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	0.329	<0.257	<0.267	---
Perfluorotetradecanoic acid (PFTA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
N-MeFOSAA	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
N-EtFOSAA	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	4.21	<0.257	<0.267	---
Perfluoropentanoic acid (PFPeA)	NE	<0.335	<0.296	---	0.884	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoro-1-octanesulfonamide (FOSA)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoro-1-heptanesulfonic acid (PFHpS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoro-1-decanesulfonic acid (PFDS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	NE	<0.335	<0.296	---	<0.330	<0.257	<0.277	---	---	<0.267	<0.274	<0.257	<0.267	---
Perfluoro-n-butanoic (PFBA)	NE	7.04	4.35	---	5.25	<0.257	<0.277	---	---	<0.267	0.895	<0.257	<0.267	---

Notes:

Units:
All results provided in ug/kg [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Sampling / Analysis and Assessment of PFAS dated June 2021 (Unrestricted Use Guidance Values)

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed
s/w: soil/water
s/g: soil/garbage
* NYSDEC requested this interval be sampled in lieu of the originally planned s/w interface bsince the s/w interface was not encountered.

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 16: Soil – Volatile Organic Compound Data Summary Table

Compound	Guidance Value Table 375-6.8(a) Unrestricted Use NY-UnRestricted SCO	Sample Collection Date / Sample Identification												
		11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
Volatiles By EPA 5035A														
1,1,1,2-Tetrachloroethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1,1-Trichloroethane	0.68	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1,2,2-Tetrachloroethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1,2-Trichloro-1,2,2-trifluoroethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1,2-Trichloroethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1-Dichloroethane	0.27	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1-Dichloroethene	0.33	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,1-Dichloropropene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2,3-Trichlorobenzene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2,3-Trichloropropane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2,4-Trichlorobenzene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2,4-Trimethylbenzene	3.6	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2-Dibromo-3-chloropropane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2-Dibromoethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2-Dichlorobenzene	1.1	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2-Dichloroethane	0.02	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,2-Dichloropropane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,3,5-Trimethylbenzene	8.4	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,3-Dichlorobenzene	2.4	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,3-Dichloropropane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
1,4-Dichlorobenzene	1.8	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.021	---	---	---
2,2-Dichloropropane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
2-Butanone	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.0077	---	---	---
2-Chlorotoluene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
2-Hexanone	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
2-Isopropyltoluene	NE	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
4-Chlorotoluene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
4-Methyl-2-pentanone	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Acetone	0.05	<0.0095	0.0094 (J)	---	<0.011	---	---	---	---	<0.0069	0.03	---	---	---
Acrolein	NE	<0.0095	<0.0081	---	<0.011	---	---	---	---	<0.0069	<0.0045	---	---	---
Acrylonitrile	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Benzene	0.06	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Bromobenzene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Bromochloromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Bromodichloromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Bromoform	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Bromomethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Carbon Disulfide	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.0034 (J)	---	---	---
Carbon tetrachloride	0.76	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Chlorobenzene	1.1	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.027	---	---	---
Chloroethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Chloroform	0.37	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Chloromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
cis-1,2-Dichloroethene	0.25	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
cis-1,3-Dichloropropene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Cyclohexane	NE	<0.0048	<0.0041		<0.0053					<0.0034	<0.0023	---	---	---
Dibromochloromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Dibromomethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Dichlorodifluoromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Ethylbenzene	1	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Hexachlorobutadiene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Isopropylbenzene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.0046	---	---	---
Methylacetate	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Methyl t-butyl ether (MTBE)	0.93	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Methylcyclohexane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Methylene chloride	0.05	<0.0095	<0.0081	---	<0.011	---	---	---	---	<0.0069	<0.0045	---	---	---
n-Butylbenzene	12	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
n-Propylbenzene	3.9	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.006	---	---	---
o-Xylene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
p&m-Xylene	NE	<0.0095	<0.0081	---	<0.011	---	---	---	---	<0.0069	<0.0045	---	---	---
Total Xylenes	0.26	<0.014	<0.012	---	<0.016	---	---	---	---	<0.010	<0.0068	---	---	---
Methyl Ethyl Ketone	0.12	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
p-Isopropyltoluene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
sec-Butylbenzene	11	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	0.003 (J)	---	---	---
Styrene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
tert-Butyl alcohol	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
tert-Butylbenzene	5.9	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Tetrachloroethene	1.3	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Tetrahydrofuran (THF)	NE	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
Toluene	0.7	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
trans-1,2-Dichloroethene	0.19	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
trans-1,3-Dichloropropene	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
trans-1,4-dichloro-2-butene	NE	NA	NA	---	---	---	---	---	---	NA	NA	---	---	---
Trichloroethene	0.47	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Trichlorofluoromethane	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Trichlorotrifluoroethane	NE	NA	NA	---	---	---	---	---	---	NA	NA	---	---	---
Vinyl Acetate	NE	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Vinyl chloride	0.02	<0.0048	<0.0041	---	<0.0053	---	---	---	---	<0.0034	<0.0023	---	---	---
Naphthalene	12	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.057 (J)	---	---	---
Tentatively Identified Compounds														
Tetradecane Isomer	NE	None	None	---	None	---	---	---	---	None	0.0097 (J)	---	---	---
Benzene Isomer (01)	NE	None	None	---	None	---	---	---	---	None	0.0099 (J)	---	---	---
Benzene Isomer (02)	NE	None	None	---	None	---	---	---	---	None	0.0073 (J)	---	---	---
Benzene Isomer (03)	NE	None	None	---	None	---	---	---	---	None	0.013 (J)	---	---	---
Cyclohexane Isomer (01)	NE	None	None	---	None	---	---	---	---	None	0.0046 (J)	---	---	---
Cyclohexane Isomer (02)	NE	None	None	---	None	---	---	---	---	None	0.0045 (J)	---	---	---
Cyclohexane Isomer	NE	None	None	---	None	---	---	---	---	None	0.0082 (J)	---	---	---
Cyclopentane Isomer	NE	None	None	---	None	---	---	---	---	None	0.0095 (J)	---	---	---
Decane Isomer (01)	NE	None	None	---	None	---	---	---	---	None	0.015 (J)	---	---	---
Decane Isomer (02)	NE	None	None	---	None	---	---	---	---	None	0.013 (J)	---	---	---
Diethylcyclopentane Isomer	NE	None	None	---	None	---	---	---	---	None	0.0046 (J)	---	---	---
Ethanone Isomer	NE	None	None	---	None	---	---	---	---	None	0.0050 (J)	---	---	---
Octane Isomer	NE	None	None	---	None	---	---	---	---	None	0.0060 (J)	---	---	---

Notes:

Units:
All results provided in mg/kg [parts per million (ppm)]

Guidance Values:
Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
J: Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC,the result is an estimated concentration.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 17: Soil – Semi-Volatile Organic Compound Data Summary Table

Compound	Units	Guidance Value Table 375-6.8(a): Unrestricted Use NY-UnRestricted SCO	Sample Collection Date / Sample Identification 11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
Semivolatiles By EPA 3546 SVOA / EPA 3550C															
1,1-Biphenyl	ug/Kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.496	---	---	---
1,2,4,5-Tetrachlorobenzene	ug/Kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
1,2,4-Trichlorobenzene	ug/Kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
1,2-Dichlorobenzene	ug/Kg	1.1	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
1,2-Diphenylhydrazine	ug/Kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
1,3-Dichlorobenzene	ug/Kg	2.4	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
1,4-Dichlorobenzene	ug/Kg	1.8	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.146	---	---	---
2,3,4,6-Tetrachlorophenol	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
2,2'-Oxybis(1-Chloropropane)	mg/kg	NE	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
2,4,5-Trichlorophenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2,4,6-Trichlorophenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2,4-Dichlorophenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2,4-Dimethylphenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2,4-Dinitrophenol	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0447	<0.0990	---	---	---
2,4-Dinitrotoluene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2,6-Dinitrotoluene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2-Chloronaphthalene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2-Chlorophenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2-Methylnaphthalene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.17	---	---	---
2-Methylphenol (o-cresol)	mg/kg	0.33	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
2-Nitroaniline	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
2-Nitrophenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
3&4-Methylphenol (m&p-cresol)	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
3,3'-Dichlorobenzidine	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
3-Nitroaniline	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
4,6-Dinitro-2-methylphenol	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
4-Bromophenyl phenyl ether	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
4-Chloro-3-methylphenol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
4-Chloroaniline	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.199	---	---	---
4-Chlorophenyl phenyl ether	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
4-Nitroaniline	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
4-Nitrophenol	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
Acenaphthene	mg/kg	20	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Acenaphthylene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Acetophenone	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Aniline	mg/kg	NE	<0.222	<0.213	---	<0.225	---	---	---	---	<0.179	<0.198	---	---	---
Anthracene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Atrazine	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzaldehyde	mg/kg	NE	0.0691 (J)	0.0707 (J)	---	0.0845 (J)	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzidine	mg/kg	NE	<0.222	<0.213	---	<0.225	---	---	---	---	<0.179	<0.198	---	---	---
Benz(a)anthracene	mg/kg	1	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzo(a)pyrene	mg/kg	1	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzo(b)fluoranthene	mg/kg	1	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzo(ghi)perylene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzo(k)fluoranthene	mg/kg	0.8	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzoic acid	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzyl alcohol	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Benzyl butyl phthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.297	---	---	---
Bis(2-chloroethoxy)methane	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Bis(2-chloroethyl)ether	mg/kg	NE	<0.0555	<0.0534	---	0.110 (J)	---	---	---	---	<0.0447	<0.0496	---	---	---
Bis(2-chloroisopropyl)ether	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Bis(2-ethylhexyl)phthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	2.14	---	---	---
Caprolactam	mg/kg	NE	<0.111	<0.107	---	<0.112	---	---	---	---	<0.0893	<0.0990	---	---	---
Carbazole	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Chrysene	mg/kg	1	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Dibenz(a,h)anthracene	mg/kg	0.33	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Dibenzofuran	mg/kg	7	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Diethyl phthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.0839 (J)	---	---	---
Dimethylphthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Di-n-butylphthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.0910 (J)	---	---	---
Di-n-octylphthalate	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Fluoranthene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Fluorene	mg/kg	30	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Hexachlorobenzene	mg/kg	0.33	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Hexachlorobutadiene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Hexachlorocyclopentadiene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Hexachloroethane	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Isophorone	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Naphthalene	mg/kg	12	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.0570 (J)	---	---	---
Nitrobenzene	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
N-Nitrosodimethylamine	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
N-Nitrosodi-n-propylamine	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
N-Nitrosodiphenylamine	mg/kg	NE	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Pentachloronitrobenzene	mg/kg	NE	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
Pentachlorophenol	mg/kg	0.8	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Phenanthrene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	0.134	---	---	---
Phenol	mg/kg	0.33	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Pyrene	mg/kg	100	<0.0555	<0.0534	---	<0.0564	---	---	---	---	<0.0447	<0.0496	---	---	---
Pyridine	mg/kg	NE	<0.222	<0.213	---	<0.225	---	---	---	---	<0.179	<0.198	---	---	---
1,4-Dioxane	mg/kg	0.1	<0.0187	<0.0198	---	<0.0192	---	---	---	---	<0.0194	<0.0194	---	---	---
Tentatively Identified Compounds															
Unknown Fatty Acid RT 12.4	mg/kg	NE	None	None	---	None	---	---	---	---	None	1.31 (J)	---	---	---
Unknown Fatty Acid RT 53.5	mg/kg	NE	None	None	---	None	---	---	---	---	None	4.23 (J)	---	---	---
Unknown Hydrocarbon RT 17.	mg/kg	NE	1.9 (J)	None	---	None	---	---	---	---	None	None	---	---	---
Unknown Hydrocarbon RT 15.5	mg/kg	NE	None	None	---	None	---	---	---	---	None	1.14 (J)	---	---	---
Unknown Hydrocarbon RT 16.3	mg/kg	NE	None	None	---	0.955 (J)	---	---	---	---	None	1.13 (J)	---	---	---
Unknown Hydrocarbon RT 16.9	mg/kg	NE	None	None	---	None	---	---	---	---	None	1.18 (J)	---	---	---
Unknown Hydrocarbon RT 17.6	mg/kg	NE	None	1.29 (J)	---	2.85 (J)	---	---	---	---	None	1.27 (J)	---	---	---
Unknown Hydrocarbon RT 18.3	mg/kg	NE	None	None	---	None	---	---	---	---	None	1.15 (J)	---	---	---
Unknown Hydrocarbon RT 18.9	mg/kg	NE	1.33 (J)	0.993 (J)	---	None	---	---	---	---	None	0.985 (J)	---	---	---
Unknown Hydrocarbon RT 19.5	mg/kg	NE	None	None	---	None	---	---	---	---	None	0.894 (J)	---	---	---
Unknown Hydrocarbon RT 20.1	mg/kg	NE	None	None	---	None	---	---	---	---	None	0.703 (J)	---	---	---
Unknown RT 11.7	mg/kg	NE	None	None	---	None	---	---	---	---	None	0.912 (J)	---	---	---
Unknown RT 12.3	mg/kg	NE	None	None	---	None	---	---	---	---	None	2.56 (J)	---	---	---
Unknown RT 17.2	mg/kg	NE	None	None	---	1.53 (J)	---	---	---	---	None	None	---	---	---
Unknown RT 18.6	mg/kg	NE	1.37 (J)	None	---	None	---	---	---	---	None	None	---	---	---
Unknown RT 18.9 (01)	mg/kg	NE	None	None	---	1.76 (J)	---	---	---	---	None	None	---	---	---
Unknown RT 18.9 (02)	mg/kg	NE	None	None	---	1.98 (J)	---	---	---	---	None	None	---	---	---
Unknown RT 19.8	mg/kg	NE	1.36 (J)	None	---	2.09 (J)	---	---	---	---	None	None	---	---	---
Unknown RT 14.1	mg/kg	NE	None	None	---	None	---	---	---	---	None	1.05 (J)	---	---	---

Notes:

Units:
All results provided in mg/kg [parts per million (ppm)]

Guidance Values:
Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
J: Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC,the result is an estimated concentration.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 18: Soil – Metals & Cyanide Data Summary Table

Compound	Guidance Value Table 375-6.8(a): Unrestricted Use NY-UnRestricted SCO	Sample Collection Date / Sample Identification												
		11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
Metals														
Aluminum	NE	11,400	11,000	---	10,100	---	---	---	---	11,400	13,300	---	---	---
Antimony	NE	<2.80	<2.7	---	<2.82	---	---	---	---	4.41	3.95	---	---	---
Arsenic	13	3.81	4.96	---	2.1	---	---	---	---	7.16	11.4	---	---	---
Barium	350	65.9	64.2	---	66.8	---	---	---	---	37.4	62.1	---	---	---
Beryllium	7.2	0.472	0.388 (B)	---	0.391 (B)	---	---	---	---	0.524	0.56	---	---	---
Cadmium	2.5	<0.336	<0.33	---	<0.338	---	---	---	---	<0.268	0.332	---	---	---
Calcium	NE	7,900	38,900 (B)	---	10,600 (B)	---	---	---	---	34,300 (B)	93,500 (B)	---	---	---
Chromium, Total	30	16.3	14.1	---	13.8	---	---	---	---	16.4	21.4	---	---	---
Chromium, Hexavalent	1	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
Trivalent Chromium	30	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
Cobalt	NE	11.6	10.5	---	9.61	---	---	---	---	11.6	10.3	---	---	---
Copper	50	23.1	15.7	---	17.7	---	---	---	---	21.3	32.8	---	---	---
Iron	NE	24,800	23,400	---	21,200	---	---	---	---	25,000	38,900	---	---	---
Lead	63	17.8	17	---	16.9	---	---	---	---	28.5	**68.4**	---	---	---
Magnesium	NE	4,230	4,330	---	3,610	---	---	---	---	5,160	4,890	---	---	---
Manganese	1,600	1,020	883	---	1,020	---	---	---	---	648	658	---	---	---
Mercury	0.18	<0.0404	<0.0389	---	<0.0406	---	---	---	---	<0.0321	0.0663	---	---	---
Nickel	30	28.7	25.4	---	23.7	---	---	---	---	28.2	26.4	---	---	---
Potassium	NE	1,380	1,350	---	1,340	---	---	---	---	1,210	1,300	---	---	---
Selenium	3.9	<2.80	<2.7	---	<2.82	---	---	---	---	<2.23	<2.48	---	---	---
Silver	2	<0.565	<0.544	---	<0.568	---	---	---	---	<0.450	<0.5	---	---	---
Sodium	NE	<56.1	77.2	---	<56.4	---	---	---	---	135	139	---	---	---
Thallium	NE	<2.80	<2.82	---	<2.82	---	---	---	---	<2.23	<2.48	---	---	---
Vanadium	NE	16	15.7	---	14.6	---	---	---	---	20.5	16.5	---	---	---
Zinc	109	68.9	59.4	---	63.3	---	---	---	---	48.8	**1,140**	---	---	---
Cyanide														
Cyanide	27	<0.673	<0.648	---	<0.677	---	---	---	---	<0.535	<0.595	---	---	---

Notes:

Background Concentrations of selected analytes in rural New York State Surface Soils, August 2005.

- Arsenic- 14.5 ppm
- Copper- 55-99 ppm
- Lead- 15,000 ppm
- Mercury- 0.15 ppm
- Nickel- 25.5-51 ppm
- Zinc- 125-250 ppm

Units:

All results provided in mg/kg [parts per million (ppm)]

Guidance Values:

Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:

Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:

--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:

B - Analyte found in associated batch blank.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying P.C.

Table 19: Soil – PCBs Data Summary Table

Compound	Guidance Value Table 375-6.8(a): Unrestricted Use NY-UnRestricted SCO	Sample Collection Date / Sample Identification												
		11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
PCBs By EPA Method 3550C														
PCB-1016	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	<0.0196	---	---	---
PCB-1221	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	<0.0196	---	---	---
PCB-1232	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	<0.0196	---	---	---
PCB-1242	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	0.107	---	---	---
PCB-1248	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	<0.0196	---	---	---
PCB-1254	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	<0.0196	---	---	---
PCB-1260	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	0.0258	---	---	---
Total PCBs	100	<0.0222	<0.0215	---	<0.0224	---	---	---	---	<0.0175	0.133	---	---	---
PCB-1262	100	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---
PCB-1268	100	NA	NA	---	NA	---	---	---	---	NA	NA	---	---	---

Notes:

Units:
All results provided in mg/kg [parts per million (ppm)]

Guidance Values:
Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed
s/w interface - soil/water interface
*s/g interface - soil/garbage interface (NYSDEC requested this interval be sampled during fieldwork in lieu of the s/w interface, since there was no s/w interface)

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying P.C.

Table 20: Soil – Herbicides Data Summary Table

Compound	Guidance Value Table 375-6.8(a): NY-UnRestricted SCO	Sample Collection Date / Sample Identification												
		11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Duplicate (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
Herbicides By EPA 8151A / 3550C														
2,4,5-T	NE	<0.0267	<0.0257	---	<0.0265	---	---	---	---	<0.0213	<0.0236	---	---	---
2,4,5-TP (Silvex)	3.8	<0.0267	<0.0257	---	<0.0265	---	---	---	---	<0.0213	<0.0236	---	---	---
2,4-D	NE	<0.0267	<0.0257	---	<0.0265	---	---	---	---	<0.0213	<0.0236	---	---	---

Notes:

Units:
All results provided in mg/kg [parts per million (ppm)]

Guidance Values:
Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 21: Soil – Pesticides Data Summary Table

Compound	Guidance Value Table 375-6.8(a): NY-UnRestricted SCO	Sample Collection Date / Sample Identification												
		11/22/2022 MW-8 (0 -2")	11/22/2022 MW-8 (2 -12")	11/22/2022 MW-8 (s/w interface)	11/22/2022 MW-8 Dup (2 -12")	11/22/2022 MW-9 (0 -2")	11/22/2022 MW-9 (2 -12")	11/22/2022 MW-9 (s/w interface)	11/21/2022 MW-10 (0 -2")	11/21/2022 MW-10 (2 -12")	11/21/2022 MW-10 (s/g interface*)	11/18/2022 MW-11 (0 -2")	11/18/2022 MW-11 (2 -12")	11/18/2022 MW-11 (s/w interface)
Pesticides By EPA 8081B / 3550C														
4,4'-DDD	0.0033	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
4,4'-DDE	0.0033	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
4,4'-DDT	0.0033	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Aldrin	0.005	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Alpha-BHC	0.02	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
alpha-Chlordane	0.094	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
beta-BHC	0.036	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
delta-BHC	0.04	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Dieldrin	0.005	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endosulfan I	2.4	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endosulfan II	2.4	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endosulfan sulfate	2.4	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endrin	0.014	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endrin aldehyde	NE	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Endrin ketone	NE	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
gamma-BHC (Lindane)	0.1	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
gamma-Chlordane	NE	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Heptachlor	0.042	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Heptachlor epoxide	NE	<0.0022	<0.00213	---	<0.00222	---	---	---	---	<0.00174	<0.00194	---	---	---
Methoxychlor	NE	<0.0022	<0.00213	---	<0.0022	---	---	---	---	<0.00174	<0.00194	---	---	---
Toxaphene	NE	<0.22	0.213	---	0.222	---	---	---	---	<0.174	<0.194	---	---	---
Chlordane, total	NE	<0.044	<0.0426	---	0.0444	---	---	---	---	<0.0347	<0.0388	---	---	---

Notes:

Units:
All results provided in mg/kg (parts per million).

Guidance Values:
Guidance levels based on BCP Unrestricted Use SCOs, 6 NYCRR Part 375, Table 375-6.8(a), except as noted.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed
s/w interface - soil/water interface
*s/g interface - soil/garbage interface (NYSDEC requested this interval be sampled during fieldwork in lieu of the s/w interface, since there was no s/w interface)

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 22: Sediment - Polyfluoroalkyl Substances (PFAS)

Compound	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	Sample Collection Date / Sample Identification					
				11/22/2022 SD-1	11/22/2022 SD-3	11/22/2022 SD-3 Duplicate	11/22/2022 SD-4	11/22/2022 SD-5	11/22/2022 BR-SD
PFAS By EPA 537m									
Perfluorobutanesulfonic acid (PFBS)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorohexanoic acid (PFHxA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluoroheptanoic acid (PFHpA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorohexanesulfonic acid (PFHxS)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorooctanoic acid (PFOA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	0.661
Perfluorooctanesulfonic acid (PFOS)	NE	NE	NE	<0.344	5.85	10.2	0.552	<0.487	3.05
Perfluorononanoic acid (PFNA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorodecanoic acid (PFDA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluoroundecanoic acid (PFUnA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorododecanoic acid (PFDoA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluorotridecanoic acid (PFTrDA)	NE	NE	NE	0.413	0.527	<0.760	<0.435	<0.487	<0.347
Perfluorotetradecanoic acid (PFTA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
N-MeFOSAA	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487 PF-CCV-L	<0.347
N-EtFOSAA	NE	NE	NE	<0.344	2.05	2.18 PF-CCV-L	<0.435 PF-CCV-L	<0.487 PF-CCV-L	<0.347 PF-CCV-L
Perfluoropentanoic acid (PFPeA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluoro-1-octanesulfonamide (FOSA)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435 PF-CCV-L	<0.487	<0.347
Perfluoro-1-heptanesulfonic acid (PFHpS)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluoro-1-decanesulfonic acid (PFDS)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	NE	NE	NE	<0.344	<2.23	<3.80	<0.435	<0.487	<0.347
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	NE	NE	NE	<0.344	<0.445	<0.760	<0.435	<0.487	<0.347
Perfluoro-n-butanoic (PFBA)	NE	NE	NE	<0.344	0.643	<0.760	<0.435	<0.487	<0.347

Notes:

Units:
All results provided in ug/kg [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment Guidance Document dated 6/24/14 (preliminary target cleanup levels for PFAS in sediment are not established yet)

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
PF-CCV-L: The CCV recovery was slightly below acceptable limits for the qualified compound. However, sample results are not biased low because results are corrected for isotope recovery.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 23: Sediment – Volatile Organic Compound Data Summary Table

Compound	Guidance Values			Sample Collection Date / Sample Identification					
	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
Volatiles By SW8260C / 5053A									
1,1,1,2-Tetrachloroethane	<9,000	9,000 - 18,000	>18,000	---	<4.5	<4.1	---	<5	---
1,1,1-Trichloroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,1,2,2-Tetrachloroethane	<2,800	2,800 - 5,400	>5,400	---	<4.5	<4.1	---	<5	---
1,1,2-Trichloro-1,2,2-trifluoroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,1,2-Trichloroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,1-Dichloroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,1-Dichloroethene	<520	520 - 4,700	>4,700	---	<4.5	<4.1	---	<5	---
1,1-Dichloropropene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,2,3-Trichlorobenzene	<230	230 -2,800	>2,800	---	<4.5	<4.1	---	<5	---
1,2,3-Trichloropropane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,2,4-Trichlorobenzene	<35,000	35,000 - 55,000	>55,000	---	<4.5	<4.1	---	<5	---
1,2,4-Trimethylbenzene	<3,400	3,400 - 30,000	>30,000	---	<4.5	<4.1	---	<5	---
1,2-Dibromo-3-chloropropane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,2-Dibromoethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,2-Dichlorobenzene	<280	280 - 2,500	>2,500	---	<4.5	<4.1	---	<5	---
1,2-Dichloroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,2-Dichloropropane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,3,5-Trimethylbenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,3-Dichlorobenzene	<1,800	1,800 - 7,100	>7,100	---	<4.5	<4.1	---	<5	---
1,3-Dichloropropane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
1,4-Dichlorobenzene	<720	720 - 3,300	>3,300	---	<4.5	<4.1	---	<5	---
2,2-Dichloropropane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
2-Butanone	NE	NE	NE	---	86	85	---	9.4 (J)	---
2-Chlorotoluene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
2-Hexanone	NE	NE	NE	---	<4.5	<4.1	---	<5	---
2-Isopropyltoluene	NE	NE	NE	---	NA	NA	---	NA	---
4-Chlorotoluene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
4-Methyl-2-pentanone	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Acetone	NE	NE	NE	---	180	190	---	50 (ICVE)	---
Acrolein	NE	NE	NE	---	<9.0	<8.2	---	<10	---
Acrylonitrile	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Benzene	<530	530 - 1,900	>1,900	---	<4.5	<4.1	---	<5	---
Bromobenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Bromochloromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Bromodichloromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Bromoform	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Bromomethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Carbon Disulfide	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Carbon tetrachloride	<1,070	1,070 - 9,600	>9,600	---	<4.5	<4.1	---	<5	---
Chlorobenzene	<200	200 - 1,700	>1,700	---	<4.5	<4.1	---	<5	---
Chloroethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Chloroform	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Chloromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
cis-1,2-Dichloroethene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
cis-1,3-Dichloropropene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Cyclohexane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Dibromochloromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Dibromomethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Dichlorodifluoromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Ethylbenzene	<430	430 - 3,700	>3,700	---	<4.5	<4.1	---	<5	---
Hexachlorobutadiene	<1,200	1,200 - 12,000	>12,000	---	<4.5	<4.1	---	<5	---
Isopropylbenzene	<210	210 - 1,800	>1,800	---	<4.5	<4.1	---	<5	---
Methylacetate	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Methyl t-butyl ether (MTBE)	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Methylcyclohexane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Methylene chloride	NE	NE	NE	---	<9.0	<4.1	---	<10 (CCVE)	---
n-Butylbenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
n-Propylbenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
o-Xylene (1,2-Xylene)	<820	820 - 7,200	>7,200	---	<4.5	<4.1	---	<5	---
p&m-Xylene (1,4-Xylene)	<530	530 - 4,700	>4,700	---	<9.0	<4.1	---	<10	---
Total Xylenes	<590	590 - 5,200	>5,200	---	<1.3	<1.2	---	<15	---
Methyl Ethyl Ketone	NE	NE	NE	---	NA	NA	---	NA	---
p-Isopropyltoluene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
sec-Butylbenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Styrene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
tert-Butyl alcohol	NE	NE	NE	---	<4.5	<4.1	---	<5	---
tert-Butylbenzene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Tetrachloroethene	<16,000	16,000 - 57,000	>57,000	---	<4.5	<4.1	---	<5	---
Tetrahydrofuran (THF)	NE	NE	NE	---	NA	NA	---	NA	---
Toluene	<930	930 - 4,500	>4,500	---	<4.5	<4.1	---	<5	---
trans-1,2-Dichloroethene	<1,200	1,200 - 11,000	>11,000	---	<4.5	<4.1	---	<5	---
trans-1,3-Dichloropropene	NE	NE	NE	---	<4.5	<4.1	---	<5	---
trans-1,4-dichloro-2-butene	NE	NE	NE	---	NA	NA	---	NA	---
Trichloroethene	<1,800	1,800 - 8,600	>8,600	---	<4.5	<4.1	---	<5	---
Trichlorofluoromethane	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Trichlorotrifluoroethane	NE	NE	NE	---	NA	NA	---	NA	---
Vinyl Acetate	NE	NE	NE	---	NA	NA	---	<5	---
Vinyl chloride	NE	NE	NE	---	<4.5	<4.1	---	<5	---
Naphthalene	NE	NE	NE	---	<0.9	<138	---	<628	---
Tentatively Identified Compounds									
Tentatively Identified Compounds	NE	NE	NE	---	None	None	---	None	---

Notes:

Units:
All results provided in ug/kg [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concetration.
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
CCVE: The value reported is estimated. The value is estimated due to its behavior during the continuing calibration verification.
J: Detected below the Reporting Limit but greater han or equal to the Method Detection Limit or in the case of a TIC, the result is an estimated concentration.
ICVE: The value reported is estimated. The value is estimated due to it

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 24: Sediment – Semi-Volatile Organic Compound Data Summary Table

Compound	Guidance Values			Sample Collection Date / Sample Identification					
	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
Semi-Volatiles By SW8270C /3510C									
1,1-Biphenyl	NE	NE	NE	---	<80.9	<138	---	<628	---
1,2,4,5-Tetrachlorobenzene	<3,000	3,000 - 14,000	>14,000	---	<161	<276	---	<1,250	---
1,2,4-Trichlorobenzene	<3,400	3,400 - 30,000	>30,000	---	<80.9	<138	---	<628	---
1,2-Dichlorobenzene	<280	280 - 2,500	>2,500	---	<80.9	<138	---	<628	---
1,2-Diphenylhydrazine	NE	NE	NE	---	<80.9	<138	---	<628	---
1,3-Dichlorobenzene	<1,800	1,800 - 7,100	>7,100	---	<80.9	<138	---	<628	---
1,4-Dichlorobenzene	<720	720 - 3,300	>3,300	---	<80.9	<138	---	<628	---
2,3,4,6-Tetrachlorophenol	NE	NE	NE	---	<80.9	<276	---	<1,250	---
2,2'-Oxybis(1-Chloropropane)	NE	NE	NE	---	NA	NA	---	NA	---
2,4,5-Trichlorophenol	NE	NE	NE	---	<80.9	<138	---	<628	---
2,4,6-Trichlorophenol	NE	NE	NE	---	<80.9	<138	---	<628	---
2,4-Dichlorophenol	NE	NE	NE	---	<80.9	<138	---	<628	---
2,4-Dimethylphenol	NE	NE	NE	---	<80.9	<138	---	<628	---
2,4-Dinitrophenol	NE	NE	NE	---	<161	<276	---	<1,250	---
2,4-Dinitrotoluene	NE	NE	NE	---	<80.9	<138	---	<628	---
2,6-Dinitrotoluene	NE	NE	NE	---	<80.9	<138	---	<628	---
2-Chloronaphthalene	NE	NE	NE	---	<80.9	<138	---	<628	---
2-Chlorophenol	NE	NE	NE	---	<80.9	<138	---	<628	---
2-Methylnaphthalene	NE	NE	NE	---	<80.9	<138	---	<628	---
2-Methylphenol (o-cresol)	NE	NE	NE	---	<80.9	<138	---	<628	---
2-Nitroaniline	NE	NE	NE	---	<161	<276	---	<1,250	---
2-Nitrophenol	NE	NE	NE	---	<80.9	<138	---	<628	---
3&4-Methylphenol (m&p-cresol)	NE	NE	NE	---	<80.9	<138	---	<628	---
3,3'-Dichlorobenzidine	NE	NE	NE	---	<80.9	<138	---	<628	---
3-Nitroaniline	NE	NE	NE	---	<161	<276	---	<1,250	---
4,6-Dinitro-2-methylphenol	NE	NE	NE	---	<161	<276	---	<1,250	---
4-Bromophenyl phenyl ether	NE	NE	NE	---	<80.9	<138	---	<628	---
4-Chloro-3-methylphenol	NE	NE	NE	---	<80.9	<138	---	<628	---
4-Chloroaniline	NE	NE	NE	---	<80.9	<138	---	<628	---
4-Chlorophenyl phenyl ether	NE	NE	NE	---	<80.9	<138	---	<628	---
4-Nitroaniline	NE	NE	NE	---	<161	<276	---	<1,250	---
4-Nitrophenol	NE	NE	NE	---	<161	<276	---	<1,250	---
Acenaphthene	NE	NE	NE	---	<80.9	<138	---	<628	---
Acenaphthylene	NE	NE	NE	---	<80.9	<138	---	<628	---
Acetophenone	NE	NE	NE	---	<80.9	<138	---	<628	---
Aniline	NE	NE	NE	---	<647	<552	---	<2,510	---
Anthracene	NE	NE	NE	---	<80.9	<138	---	<628	---
Atrazine	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzaldehyde	NE	NE	NE	---	87.8 (J)	<138	---	<628	---
Benzidine	NE	NE	NE	---	<323	<552	---	<2,510	---
Benz(a)anthracene	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzo(a)pyrene	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzo(b)fluoranthene	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzo(ghi)perylene	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzo(k)fluoranthene	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzoic acid	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzyl alcohol	NE	NE	NE	---	<80.9	<138	---	<628	---
Benzyl butyl phthalate	NE	NE	NE	---	<80.9	<138	---	<628	---
Bis(2-chloroethoxy)methane	NE	NE	NE	---	<80.9	<138	---	<628	---
Bis(2-chloroethyl)ether	NE	NE	NE	---	<80.9	<138	---	<628	---
Bis(2-chloroisopropyl)ether	NE	NE	NE	---	<80.9	<138	---	<628	---
Bis(2-ethylhexyl)phthalate	<360,000	>360,000	NE	---	<80.9	<138	---	<628	---
Caprolactam	NE	NE	NE	---	<161	<276	---	<1,250	---
Carbazole	NE	NE	NE	---	<80.9	<138	---	<628	---
Chrysene	NE	NE	NE	---	<80.9	<138	---	<628	---
Dibenz(a,h)anthracene	NE	NE	NE	---	<80.9	<138	---	<628	---
Dibenzofuran	NE	NE	NE	---	<80.9	<138	---	<628	---
Diethyl phthalate	NE	NE	NE	---	<80.9	<138	---	<628	---
Dimethylphthalate	NE	NE	NE	---	<80.9	<138	---	<628	---
Di-n-butylphthalate	NE	NE	NE	---	<80.9	<138	---	<628	---
Di-n-octylphthalate	NE	NE	NE	---	<80.9	<138	---	<628	---
Fluoranthene	NE	NE	NE	---	<80.9	<138	---	<628	---
Fluorene	NE	NE	NE	---	<80.9	<138	---	<628	---
Hexachlorobenzene	NE	NE	NE	---	<80.9	<138	---	<628	---
Hexachlorobutadiene	NE	NE	NE	---	<80.9	<138	---	<628	---
Hexachlorocyclopentadiene	<810	810 - 8,100	>8,100	---	<80.9	<138	---	<628	---
Hexachloroethane	NE	NE	NE	---	<80.9	<138	---	<628	---
Indeno(1,2,3-cd)pyrene	NE	NE	NE	---	<80.9	<138	---	<628	---
Isophorone	NE	NE	NE	---	<80.9	<138	---	<628	---
Naphthalene	NE	NE	NE	---	<80.9	<138	---	<628	---
Nitrobenzene	NE	NE	NE	---	<80.9	<138	---	<628	---
N-Nitrosodimethylamine	NE	NE	NE	---	<80.9	<138	---	<628	---
N-Nitrosodi-n-propylamine	NE	NE	NE	---	<80.9	<138	---	<628	---
N-Nitrosodiphenylamine	NE	NE	NE	---	<80.9	<138	---	<628	---
Pentachloronitrobenzene	<150	150 - 2000	>2,000	---	NA	NA	---	NA	---
Pentachlorophenol	<14,000	14,000 - 19,000	>19,000	---	<80.9	<138	---	<628	---
Phenanthrene	NE	NE	NE	---	<80.9	<138	---	<628	---
Phenol	NE	NE	NE	---	<80.9	<138	---	<628	---
Pyrene	NE	NE	NE	---	<80.9	<138	---	<628	---
Pyridine	NE	NE	NE	---	<323	<552	---	<2,510	---
1,4-Dioxane	NE	NE	NE	<19.8	<19.4	<19.2	<19.4	<19.2	<19
Tentatively Identified Compounds									
Unknown Hydrocarbon RT 17.6	---	---	---	---	1,840 (J)	None	---	None	---
Unknown Hydrocarbon RT 18.9	---	---	---	---	1,570 (J)	None	---	None	---
Unknown RT 19.0	---	---	---	---	1,490 (J)	None	---	None	---
Vitamin E RT 19.4	---	---	---	---	3,280 (J, N)	None	---	None	---

Notes:

Units:
All results provided in ug/kg [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Value

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
J: Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC,the result is an estimated concentration.
N: The Tentatively Identified Compound reported indicates the presence of an possible analyte or class of analyte that has beententatively identified'and the associated numerical value represents its estimated concentration.

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Table 25: Sediment – Metals and Cyanide Data Summary Table

Compound	Guidance Values			Sample Collection Date / Sample Identification							
	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/8/2022 SD-3 MS	11/8/2022 SD-3 MSD	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
Metals											
Aluminum	NE	NE	NE	---	8,100	18,000			---	12,000	---
Antimony	NE	NE	NE	---	<4.07	<6.95			---	<4.19	---
Arsenic	<10	10 - 33	>33	---	17.4	**37.9**			---	10.1	---
Barium	NE	NE	NE	---	58.8	121			---	72	---
Beryllium	NE	NE	NE	---	0.221	0.522			---	0.469	---
Cadmium	<1	1 - 5	>5	---	<0.489	<0.835			---	<0.503	---
Calcium	NE	NE	NE	---	2,870 (B)	6,000 (B)			---	50,300 (B)	---
Chromium, Total	<43	43 - 110	>110	---	12.5	25.7			---	25.1	---
Cobalt	NE	NE	NE	---	12.2	21.5			---	9.94	---
Copper	<32	32 - 150	>150	---	19	41.3			---	32.9 (B)	---
Cyanide	NE	NE	NE	---	<0.978	<1.67			---	<1.01	---
Iron	NE	NE	NE	---	19,100	42,300			---	22,100	---
Lead	<36	36 - 130	>130	---	22	47.8			---	45.8	---
Magnesium	NE	NE	NE	---	2,480	5,370			---	5,810	---
Manganese	NE	NE	NE	---	666	1,770			---	273	---
Mercury	<0.2	0.2 - 1	>1	---	0.0733	<0.100			---	<0.0604	---
Nickel	<23	23 - 49	>49	---	20.8	43.6			---	33.4	---
Potassium	NE	NE	NE	---	1,030	2,210			---	1,930 B	---
Selenium	NE	NE	NE	---	4.79	13			---	<4.19	---
Silver	<1	1 - 2.2	>2.2	---	<0.821	<1.40			---	<0.845	---
Sodium	NE	NE	NE	---	419	395			---	<83.8	---
Thallium	NE	NE	NE	---	<4.07	<6.95			---	<4.19	---
Vanadium	NE	NE	NE	---	13.8	29.4			---	45.6	---
Zinc	NE	NE	NE	---	106	206			---	125 (B)	---
Cyanide											
Cyanide	NE	NE	NE	---	<0.0587	<1.67	---	---	---	<1.01	---

Notes:

Units:
All results provided in mg/kg [parts per million (ppm)]

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
B: Analyte is also found in the associated batch blank (common laboratory contaminant).

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 26: Polychlorinated Biphenyls (PCBs) in Sediment

Compound	Guidance Values			Sample Collection Date / Sample Identification					
	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
PCBs By SW8082A / 3550C									
PCB-1016	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1221	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1232	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1242	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1248	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1254	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1260	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
Total PCBs	<100	100 - 1000	>1000	---	<32.2	<54.7	---	<33.1	---
PCB-1262	<100	100 - 1000	>1000	---	NA	NA	---	NA	---
PCB-1268	<100	100 - 1000	>1000	---	NA	NA	---	NA	---

Notes:

Units:
All results provided in ug/kg (parts per billion).

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

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Table 27: Herbicides in Sediment

Compound	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	Sample Collection Date / Sample Indentification					
				11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
Herbicides By EPA 8151A / 3550C									
2,4,5-T	NE	NE	NE	---	<0.0391	<0.0668	---	<0.0402	---
2,4,5-TP (Silvex)	NE	NE	NE	---	<0.0391	<0.0668	---	<0.0402	---
2,4-D	NE	NE	NE	---	<0.0391	<0.0668	---	<0.0402	---

Notes:

Units:
All results provided in mg/kg (parts per million).

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

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Crawford & Associates Engineering & Land Surveying, P.C.

Table 28: Pesticides in Sediment

Compound	Guidance Values			Sample Collection Date / Sample Identification					
	NYSDEC Screening & Assessment of Contaminated Sediment CLASS A [Low Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS B [Potential Risk]	NYSDEC Screening & Assessment of Contaminated Sediment CLASS C [High Risk]	11/8/2022 SD-1	11/8/2022 SD-3	11/8/2022 SD-3 Duplicate	11/9/2022 SD-4	11/9/2022 SD-5	11/8/2022 BR-SD
Pesticides By EPA 8081B / 3550C									
4,4'-DDD	<44	44 - 48,000	> 48,000	---	<3.19	<5.2	---	<3.28	---
4,4'-DDE	<44	44 - 48,000	> 48,000	---	<3.19	<5.2	---	<3.28	---
4,4'-DDT	<44	44 - 48,000	> 48,000	---	<3.19	<5.2	---	<3.28	---
Aldrin	NE	NE	NE	---	<3.19	<5.2	---	<3.28	---
Alpha-BHC	<47	47 - 78	>78	---	<3.19	<5.2	---	<3.28	---
alpha-Chlordane	<68	68 - 38,000	>38,000	---	<3.19	<5.2	---	<3.28	---
beta-BHC	<47	47 - 78	>78	---	<3.19	<5.2	---	<3.28	---
delta-BHC	<47	47 - 78	>78	---	<3.19	<5.2	---	<3.28	---
Dieldrin	<180	180 - 780	>780	---	<3.19	<5.2	---	<3.28	---
Endosulfan I	<1	1 - 20	>20	---	<3.19	<5.2	---	<3.28	---
Endosulfan II	<1	1 - 20	>20	---	<3.19	<5.2	---	<3.28	---
Endosulfan sulfate	<1	1 - 20	>20	---	<3.19	<5.2	---	<3.28	---
Endrin	<90	90 - 220	>220	---	<3.19	<5.2	---	<3.28	---
Endrin aldehyde	<90	90 - 220	>220	---	<3.19	<5.2	---	<3.28	---
Endrin ketone	<90	90 - 220	>220	---	<3.19	<5.2	---	<3.28	---
gamma-BHC (Lindane)	<47	47 - 78	>78	---	<3.19	<5.2	---	<3.28	---
gamma-Chlordane	<68	68 - 38,000	>38,000	---	<3.19	<5.2	---	<3.28	---
Heptachlor	<75	75 - 10,000	>10,000	---	<3.19	<5.2	---	<3.28	---
Heptachlor epoxide	<15	15 - 2,100	>2,100	---	<3.19	<5.2	---	<3.28	---
Methoxychlor	<59	>59	NE	---	<3.19	<5.2	---	<3.28	---
Toxaphene	<6	6 - 250	>250	---	<319	<542	---	<328	---
Chlordane, total	<68	68 - 38,000	>38,000	---	<63.9	<108	---	<65.5	---

Notes:

Units:
All results provided in ug/kg (parts per billion).

Guidance Values:
Guidance levels based on NYSDEC Screening & Assessment of Contaminated Sediment (6/24/14), Class A, B & C.

Highlighting:
Blue highlighting indicates a detectable concentration
Purple highlighting indicates the value falls within the Class A Guidance Criteria Range
Yellow highlighting indicates the value falls within the Class B Guidance Criteria Range
Bold and red highlighting indicates the value falls within the Class C Guidance Criteria Range
Green Highlighting indicates that the laboratory method detection limit is greater than the Guidance Values

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 29: Rinse Blanks – PFAS Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
PFOA & PFOS By EPA 537.1									
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorohexanoic acid (PFHxA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorooctanoic acid (PFOA)	ng/L	10	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorooctanesulfonic acid (PFOS)	ng/L	10	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorononanoic acid (PFNA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluorodecanoic acid (PFDA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluoroundecanoic acid (PFUnA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
Perfluorododecanoic acid (PFDoA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
Perfluorotridecanoic acid (PFTrDA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
Perfluorotetradecanoic acid (PFTA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
N-MeFOSAA	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
N-EtFOSAA	ng/L	NE	<1.85 (PF-CCV-L)	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
Perfluoropentanoic acid (PFPeA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluoro-1-octanesulfonamide (FOSA)	ng/L	NE	<1.85 (PF-CCV-L)	<1.79	<1.92	<1.85 (PF-CCV-L)	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
Perfluoro-1-heptanesulfonic acid (PFHpS)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85
Perfluoro-1-decanesulfonic acid (PFDS)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85 (PF-CCV-L)
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	ng/L	NE	<4.63	<4.46	<4.81	<4.63	<4.63	<5.00 (HT-PR, PF-CCV-L)	<4.63
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<10.0 (HT-PR)	<1.85
Perfluoro-n-butanoic (PFBA)	ng/L	NE	<1.85	<1.79	<1.92	<1.85	<1.85	<2.00 (HT-PR)	<1.85

Notes:

Units:
All results provided in ng/L [parts per trillion (ppt)]

Guidance Values:
NYSDOH Drinking Water Standards for Public Systems [PFAS to be further assessed & considered as potential contaminants of concern if detected in groundwater or surface water at or above 10ng/L (PPT) and are attributed to the site.]

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
PF-CCV-L: The CCV recovery was slightly below acceptable limits for the qualified compound. However, sample results are not biased low because results are corrected for isotope recovery.
HT-PR: Sample was prepered outside of the recommended holding time.

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Table 30: Trip & Rinse Blanks – Volatile Organic Compound Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification												
			11/8/2022 Trip Blank	11/15/2022 Trip Blank	11/17/2022 Trip Blank	11/21/2022 Trip Blank	11/22/2022 Trip Blank	12/5/2022 Trip Blank	11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
Volatiles By EPA 5030B															
1,1,1,2-Tetrachloroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1,1-Trichloroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1,2,2-Tetrachloroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1,2-Trichloroethane	ug/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1,2-Trichlorotrifluoroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloroethene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,1-Dichloropropene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2,3-Trichlorobenzene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2,3-Trichloropropane	ug/L	0.04	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2,4-Trichlorobenzene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2,4-Trimethylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	1.53	---	---	<0.2	---
1,2-Dibromo-3 chloropropane	ug/L	0.04	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2 Dibromoethane	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichlorobenzene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichloroethane	ug/L	0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,2-Dichloropropane	ug/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,3,5-Trimethylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	0.29 (J)	---	---	<0.2	---
1,3-Dichlorobenzene	ug/L	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,3-Dichloropropane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
1,4-Dichlorobenzene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
2-Butanone	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
2-Hexanone	ug/L	50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
4 Methyl-2-pentanone	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Acetone	ug/L	50	4.4 (CCVE)	<1	<1	<1 (ICVE)	<1	<1	---	<1	<1	---	---	<1	---
Acrolein	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Acrylonitrile	ug/L	0.07	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
2,2-Dichloropropane	ug/L	5	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
2-Chlorotoluene	ug/L	5	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
4-Chlorotoluene	ug/L	5	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
Benzene	ug/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Bromobenzene	ug/L	5	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
Bromochloromethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Bromodichloromethane	ug/L	50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Bromoform	ug/L	50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Bromomethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 (CCVE-QL-02)	---	<0.2	<0.2	---	---	<0.2 (CCVE, QL-02)	---
Carbon disulfide	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Carbon tetrachloride	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Chlorobenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Chloroethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Chloroform	ug/L	7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Chloromethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
cis-1,2-Dichloroethene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
cis-1,3-Dichloropropene	ug/L	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Cyclohexane	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 (QL-02)	---	<0.2	<0.2	---	---	<0.2 (QL-02)	---
Dibromochloromethane	ug/L	50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Dibromomethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Dichlorodifluoromethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Ethylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	0.41 (J)	---	---	<0.2	---
Hexachlorobutadiene	ug/L	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 (QL-02, CCVE)	---	<0.2	<0.2	---	---	<0.2 (CCVE, QL-02)	---
Isopropylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Methyl acetate	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Methlycyclohexane	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Methyl t-butyl ether (MTBE)	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Methylene chloride	ug/L	5	<1	<1	<1	<1	1.43 (J)	<1	---	1.53 (J)	<1	---	---	<1	---
Naphthalene	ug/L	10	<1	<1	<1	<1	<1	<1	---	<1	3.4	---	---	<1	---
n-Butylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
n-Propylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
o-Xylene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
m&p-Xylene	ug/L	NE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	---	<0.5	1.07	---	---	<0.5	---
*p-Diethylbenzene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	0.21 (J)	---	---	<0.2	---
*p-Ethyltoluene	ug/L	NE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
p-Isopropyltoluene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
sec-Butylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Styrene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
tert butyl alcohol (TBA)	ug/L	NE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	---	<0.5	<0.5	---	---	<0.2	---
tert-Butylbenzene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Tetrachloroethene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	0.25 (J)	<0.2	---	---	<0.2	---
Toluene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Total 1,3-Dichloropropene	ug/L	0.4	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
Total Trihalomethanes	ug/L	NE	NA	NA	NA	NA	NA	NA	---	NA	NA	---	---	NA	---
Total Xylenes	ug/L	5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	---	<0.6	1.07 (J)	---	---	<0.6	---
trans-1,2-Dichloroethene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
trans-1,3-Dichloropropene	ug/L	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Trichloroethylene	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Trichlorofluoromethane	ug/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Vinyl chloride	ug/L	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	<0.2	<0.2	---	---	<0.2	---
Tentatively Identified Compounds															
Tentatively Identified Compounds	ug/L	NE	None	None	None	---	None	None	---	None	None	---	---	None	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
J: Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC, the result is an estimated concentration.
CCVE: The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
QL-02: This LCS analyte is outside Laboratory Recovery limits due the analyte behavior using the referenced method. The reference method has certain limitations with respect to analytes of this nature.
ICVE: The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration verification (recovery exceeded 30% of expected value).
* - Analyte is not certified or the state of the samples origination does not offer certification for the analyte.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 31: Rinse Blanks – Semi-Volatile Organic Compound Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
Semivolatiles By EPA 8270 / 3510C									
1,1-Biphenyl	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
1,2,4,5-Tetrachlorobenzene	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
1,2,4-Trichlorobenzene	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
1,2-Dichlorobenzene	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
1,2-Diphenylhydrazine	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
1,3-Dichlorobenzene	ug/L	3	---	<2.63	<2.63	---	---	<2.5	---
1,4-Dichlorobenzene	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
2,3,4,6-Tetrachlorophenol	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
2,4,5-Trichlorophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2,4,6-Trichlorophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2,4-Dichlorophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2,4-Dimethylphenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2,4-Dinitrophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2,4-Dinitrotoluene	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
2,6-Dinitrotoluene	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
2-Chloronaphthalene	ug/L	10	---	<2.63	<2.63	---	---	<2.5	---
2-Chlorophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2-Methylnapththalene	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
2-Methylphenol (o-cresol)	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
2-Nitroaniline	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
2-Nitrophenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
3&4-Methylphenol (m&p-cresol)	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
3,3'-Dichlorobenzidine	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
3-Nitroaniline	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
4,6-Dinitro-2-methylphenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
4-Bromophenyl phenyl ether	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
4-Chloro-3-methylphenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
4-Chloroaniline	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
4-Chlorophenyl phenyl ether	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
4-Nitroaniline	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
4-Nitrophenol	ug/L	1	---	<5.26	<5.26	---	---	<5	---
Acenaphthene	ug/L	20	---	<0.0526	<0.0526	---	---	<0.05	---
Acenaphthylene	ug/L	NE	---	<0.0526	<0.0526	---	---	<0.05	---
Acetophenone	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Aniline	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
Anthracene	ug/L	50	---	<0.0526	<0.0526	---	---	<0.05	---
Atrazine	ug/L	3	---	<0.526	<0.526	---	---	<0.5	---
Benzaldehyde	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Benzidine	ug/L	5	---	<2.63	<5.26	---	---	<5	---
Benz(a)anthracene	ug/L	0.002	---	<0.056	<0.0526	---	---	<0.05	---
Benzo(a)pyrene	ug/L	NE	---	<0.0526	<0.0526	---	---	<0.05	---
Benzo(b)fluoranthene	ug/L	0.002	---	<0.0526	<0.0526	---	---	<0.05	---
Benzo(ghi)perylene	ug/L	NE	---	<0.0526	<0.0526	---	---	<0.05	---
Benzo(k)fluoranthene	ug/L	0.002	---	<0.0526	<0.0526	---	---	<0.05	---
Benzoic acid	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Benzyl alcohol	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Benzyl butyl phthalate	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Bis(2-chloroethoxy)methane	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
Bis(2-chloroethyl)ether	ug/L	1	---	<1.05	<1.05	---	---	<1	---
Bis(2-chloroisopropyl)ether	ug/L	5	---	<2.63	<2.63	---	---	<2.5	---
Bis(2-ethylhexyl)phthalate	ug/L	5	---	<0.526	0.621 (B)	---	---	3.02	---
Caprolactum	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Chrysene	ug/L	0.002	---	<0.0526	<0.0526	---	---	<0.05	---
Carbazole	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Dibenzofuran	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
Dibenzo(a,h) anthracene	ug/L	NE	---	<0.0526	<0.0526	---	---	<0.05	---
Diethyl phthalate	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Dimethylphthalate	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Di-n-butylphthalate	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Di-n-octylphthalate	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Fluoranthene	ug/L	50	---	<0.0526	<0.0526	---	---	<0.05	---
Fluorene	ug/L	50	---	0.189	0.189	---	---	<0.05	---
Hexachlorobenzene	ug/L	0.04	---	<0.0211	<0.0211	---	---	<0.02	---
Hexachlorobutadiene	ug/L	0.5	---	<0.526	<0.526	---	---	<0.5	---
Hexachlorocyclopentadiene	ug/L	5	---	<5.26	<5.26	---	---	<5	---
Naphthalene	ug/L	10	---	<0.0526	<0.0526	---	---	<0.05	---
Nitrobenzene	ug/L	0.4	---	<0.263	<0.263	---	---	0.25	---
Hexachloroethane	ug/L	5	---	<0.526	<0.526	---	---	<0.5	---
Indeno(1,2,3-cd)pyrene	ug/L	0.002	---	<0.0526	<0.0526	---	---	<0.05	---
Isophorone	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
N-Nitrosodi-n-propylamine	ug/L	NE	---	<2.63	<2.63	---	---	<2.5	---
N-Nitrosodiphenylamine	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
N-Nitrosodimethylamine	ug/L	50	---	<0.0526	<0.526	---	---	<0.5	---
Pentachlorophenol	ug/L	NE	---	<0.263	<0.0526	---	---	<0.25	---
Pyridine	ug/L	50	---	<2.63	<2.63	---	---	<2.5	---
Pyrene	ug/L	NE	---	<0.0526	<0.0526	---	---	<0.05	---
Phenanthrene	ug/L	NE	---	<0.0526	<0.0526	---	---	<2.5	---
Phenol	ug/L	1	---	<2.63	<2.63	---	---	<2.5	---
1,4-Dioxane	ug/L	1	---	<0.3	<0.3	---	---	<0.3	---
Tentatively Identified Compounds									
Tentatively Identified Compounds	ug/L	NE	---	None	None	---	---	None	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
B: Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants.

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Table 32: Rinse Blanks – Metals and Cyanide Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
Target Analyte List Metals									
Aluminum	mg/L	2	---	<0.056	<0.0556	---	---	<0.0556	---
Antimony	mg/L	0.003	---	<0.028	<0.00111	---	---	<0.00111	---
Arsenic	mg/L	0.025	---	<0.017	<0.00111	---	---	<0.00111	---
Beryllium	mg/L	0.003	---	<0.0006	<0.000333	---	---	<0.000333	---
Barium	mg/L	1	---	<0.028	<0.0278	---	---	<0.0278	---
Cadmium	mg/L	0.005	---	<0.003	<0.000556	---	---	<0.000556	---
Calcium	mg/L	NE	---	0.275 (B)	0.607 (B)	---	---	0.107	---
Chromium	mg/L	0.05	---	<0.006	<0.00556	---	---	<0.00556	---
Chromium, Hexavalent	mg/L	0.05	---	NA	NA	---	---	NA	---
Cobalt	mg/L	NE	---	<0.004	<0.00444	---	---	<0.00444	---
Copper	mg/L	0.2	---	<0.022	<0.0222	---	---	<0.0222	---
Iron	mg/L	0.3	---	<0.278	0.297	---	---	<0.278	---
Lead	mg/L	0.025	---	<0.006	<0.00556	---	---	<0.0556	---
Magnesium	mg/L	NE	---	<0.056	<0.0556	---	---	<0.0556	---
Manganese	mg/L	0.3	---	<0.006	0.0157	---	---	<0.00556	---
Mercury	mg/L	0.0007	---	<0.0002	<0.0002	---	---	<0.0002	---
Nickel	mg/L	0.1	---	<0.011	<0.0111	---	---	<0.011	---
Potassium	mg/L	NE	---	<0.056	<0.0556	---	---	<0.0556	---
Selenium	mg/L	0.01	---	<0.028	<0.0111	---	---	0.00224	---
Silver	mg/L	0.05	---	<0.006	<0.00556	---	---	<0.00556	---
Thallium	mg/L	0.0005	---	<0.028	<0.00111	---	---	<0.00111	---
Sodium	mg/L	20	---	<0.556	0.572	---	---	0.976 (B)	---
Vanadium	mg/L	NE	---	<0.011	<0.0111	---	---	<0.0111	---
Zinc	mg/L	5	---	<0.028	0.0299	---	---	0.0322	---
Cyanide									
Cyanide	mg/L	27	---	<0.01	<0.01	---	---	<0.01	---

Notes:

Units:
All results provided in mg/L [parts per million (ppm)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.
Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
B: Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants.

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 33: Rinse Blanks – PCBs Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
PCBs By SW8082A									
PCB-1016	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1221	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1232	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1242	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1248	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1254	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1260	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
Total PCBs	ug/L	0.09	---	<0.0556	<0.0541	---	---	<0.0541	---
PCB-1262	ug/L	NE	---	NA	NA	---	---	NA	---
PCB-1268	ug/L	NE	---	NA	NA	---	---	NA	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 34: Rinse Blanks – Herbicides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
Chlorinated Herbicides By SW8151A									
2,4,5-T	ug/L	35	---	<5	<5	---	---	<5	---
2,4,5-TP (Silvex)	ug/L	0.26	---	<5	<5	---	---	<5	---
2,4-D	ug/L	50	---	<5	<5	---	---	<5	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
None

C&A File: 5447.0

Crawford & Associates Engineering & Land Surveying, P.C.

Table 35: Rinse Blanks – Pesticides Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification						
			11/14/2022 Equipment Rinse 1	11/15/2022 Equipment Rinse 2	11/17/2022 Equipment Rinse 3	11/21/2022 Equipment Rinse 4	11/22/2022 Equipment Rinse 5	12/5/2022 Equipment Rinse 6	12/6/2022 Equipment Rinse 7
Pesticides By EPA SW846-3510C Low Level									
4,4' -DDD	ug/L	0.3	---	<0.00444	<0.00432	---	---	<0.00432	---
4,4' -DDE	ug/L	0.2	---	<0.00444	<0.00432	---	---	<0.00432	---
4,4' -DDT	ug/L	0.2	---	<0.00444	<0.00432	---	---	<0.00432	---
Aldrin	ug/L	NE	---	<0.00444	<0.00432	---	---	<0.00432	---
alpha-BHC	ug/L	0.01	---	<0.00444	<0.00432	---	---	<0.00432	---
Alachlor	ug/L	0.5	---	NA	NA	---	---	NA	---
alpha-Clordane	ug/L	0.05	---	<0.00444	<0.00432	---	---	<0.00432	---
beta-BHC	ug/L	0.04	---	<0.00444	<0.00432	---	---	<0.00432	---
delta-BHC	ug/L	0.04	---	<0.00444	<0.00432	---	---	<0.00432	---
Dieldrin	ug/L	0.004	---	<0.00222	<0.00216	---	---	<0.00216	---
Endosulfan I	ug/L	NE	---	<0.00444	<0.00432	---	---	<0.00432	---
Endosulfan II	ug/L	NE	---	<0.00444	<0.00432	---	---	<0.00432	---
Endosulfan Sulfate	ug/L	NE	---	<0.00444	<0.00432	---	---	<0.00432	---
Endrin	ug/L	NE	---	<0.00444	<0.00432	---	---	<0.00432	---
Endrin Aldehyde	ug/L	5	---	<0.0111	<0.0108	---	---	<0.0108	---
Endrin ketone	ug/L	5	---	<0.0111	<0.0108	---	---	<0.0108	---
gama-BHC (Lindane)	ug/L	0.05	---	<0.00444	<0.00432	---	---	<0.00432	---
gama-Chlordane	ug/L	0.05	---	<0.0111	<0.0108	---	---	<0.0108	---
Heptachlor	ug/L	0.04	---	<0.00444	<0.00432	---	---	<0.00432	---
Heptachlor epoxide	ug/L	0.03	---	<0.00444	<0.00432	---	---	<0.00432	---
Hexachlorobenzene	ug/L	0.04	---	NA	NA	---	---	NA	---
Hexachlorocyclopentadiene	ug/L	5	---	NA	NA	---	---	NA	---
Lindane	ug/L	0.05	---	NA	NA	---	---	NA	---
Methoxychlor	ug/L	35	---	<0.00444	<0.00432	---	---	<0.00432	---
Propachlor	ug/L	35	---	NA	NA	---	---	NA	---
Toxaphene	ug/L	0.06	---	<0.111	<0.108	---	---	<0.108	---
*Chlordane, total (alpha, gama)	ug/L	0.05	---	<0.0111	<0.0108	---	---	<0.0108	---

Notes:

Units:
All results provided in ug/L [parts per billion (ppb)]

Guidance Values:
Guidance levels based on NYSDEC Division of Water TOGS Water Quality Standards and Guidance Values DOW TOGs 1.1.1 (June 1998) and subsequent NYSDEC memoranda & 6 NYCRR Part 703 Groundwater Standards, as appropriate.

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
* Analyte is not certified or the state of the samples origination does not offer certification for the analyte.

C&A File: 5447.0

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Table 36: Field Blanks – PFAS Data Summary Table

Compound	Units	Guidance Value	Sample Collection Date / Sample Identification										
			11/8/2022 Field Blank Surface Water	11/8/2022 Field Blank Sediment	11/9/2022 Field Blank	11/14/2022 Field Blank	11/15/2022 Field Blank	11/17/2022 Field Blank	11/18/2022 Field Blank	11/21/2022 Field Blank	11/22/2022 Field Blank	12/5/2022 Field Blank	12/6/2022 Field Blank
PFOA & PFOS By EPA 537.1													
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorohexanoic acid (PFHxA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorooctanoic acid (PFOA)	ng/L	10	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorooctanesulfonic acid (PFOS)	ng/L	10	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorononanoic acid (PFNA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluorodecanoic acid (PFDA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluoroundecanoic acid (PFUnA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92 (PF-CCV-L)
Perfluorododecanoic acid (PFDoA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92 (PF-CCV-L)
Perfluorotridecanoic acid (PFTrDA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92 (PF-CCV-L)
Perfluorotetradecanoic acid (PFTA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)
N-MeFOSAA	ng/L	NE	<1.92 (PF-CCV-L)	<1.89 (PF-CCV-L)	<1.85 (PF-CCV-L)	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)
N-EtFOSAA	ng/L	NE	<1.92 (PF-CCV-L)	<1.89 (PF-CCV-L)	<1.85 (PF-CCV-L)	<1.85 (PF-CCV-L)	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluoropentanoic acid (PFPeA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluoro-1-octanesulfonamide (FOSA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85 (PF-CCV-L)	<1.79	<1.92	<1.79 (PF-CCV-L)	<1.92 (PF-CCV-L)	<1.85	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)
Perfluoro-1-heptanesulfonic acid (PFHpS)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluoro-1-decanesulfonic acid (PFDS)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89 (PF-CCV-L)	<1.92 (PF-CCV-L)
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	ng/L	NE	<4.81	<4.73	<4.63	<4.63	<4.46	<4.81	<4.46	<4.81	<4.63	<4.73	<4.81
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	ng/L	NE	<1.92 (PF-CCV-L)	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92
Perfluoro-n-butanoic (PFBA)	ng/L	NE	<1.92	<1.89	<1.85	<1.85	<1.79	<1.92	<1.79	<1.92	<1.85	<1.89	<1.92

Notes:

Units:
All results provided in ng/L [parts per trillion (ppt)]

Guidance Values:
NYSDOH Drinking Water Standards for Public Systems [PFAS to be further assessed & considered as potential contaminants of concern if detected in groundwater or surface water at or above 10ng/L (PPT) and are attributed to the site.]

Highlighting:
Bold and red highlighting indicates that the result exceeds the designated guidance level.
Green highlighting indicates that the lab method detection limit exceeds the established guidance value.
Blue highlighting indicates a detectable concentration of the analyte.

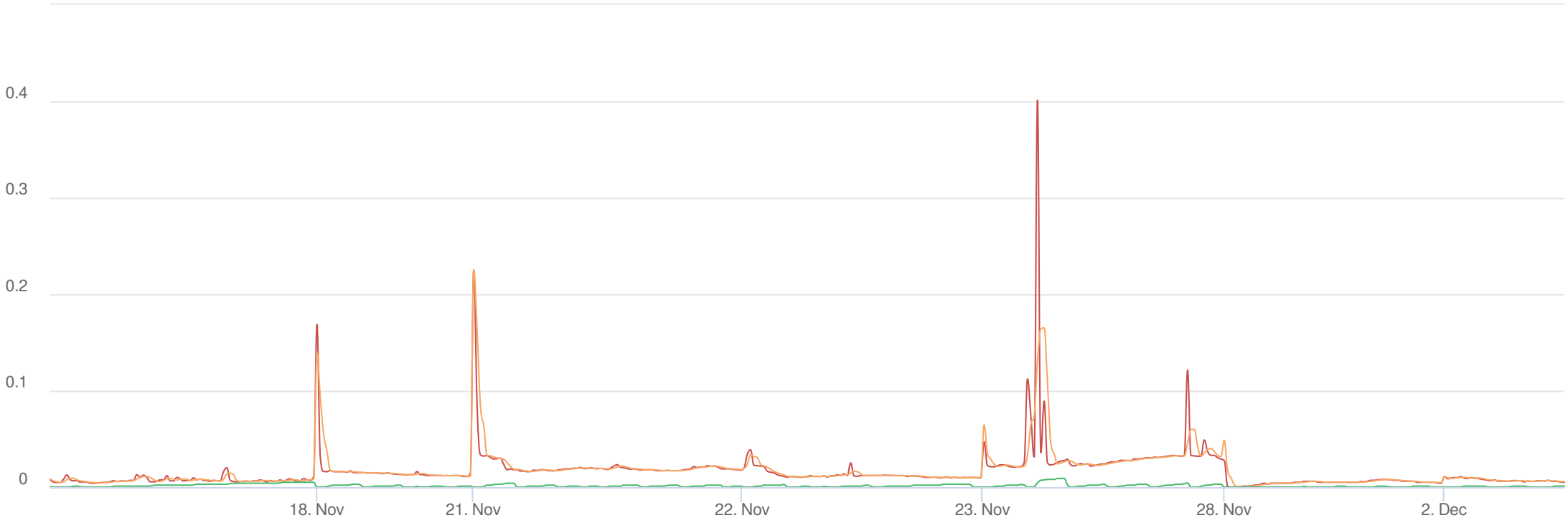
Micellaneous Symbols & Acronyms:
--- Not Sampled
NE - Not Established
NA - Not Analyzed

Applicable Laboratory Qualifiers:
PF-CCV-L: The CCV recovery was slightly below acceptable limits for the qualified compound. However, sample results are not biased low because results are corrected for isotope recovery.

C&A File: 5447.0

APPENDIX K: CAMP DATA

11/01/2022 10:20:00 – 12/07/2022 13:20:00
(GMT-05:00) Eastern Time (US & Canada)



Mass Conc. Total mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0	0.016	1.41

Mass Conc. Total mg/m³ AVG 15m
mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0.0001	0.0167	0.2585

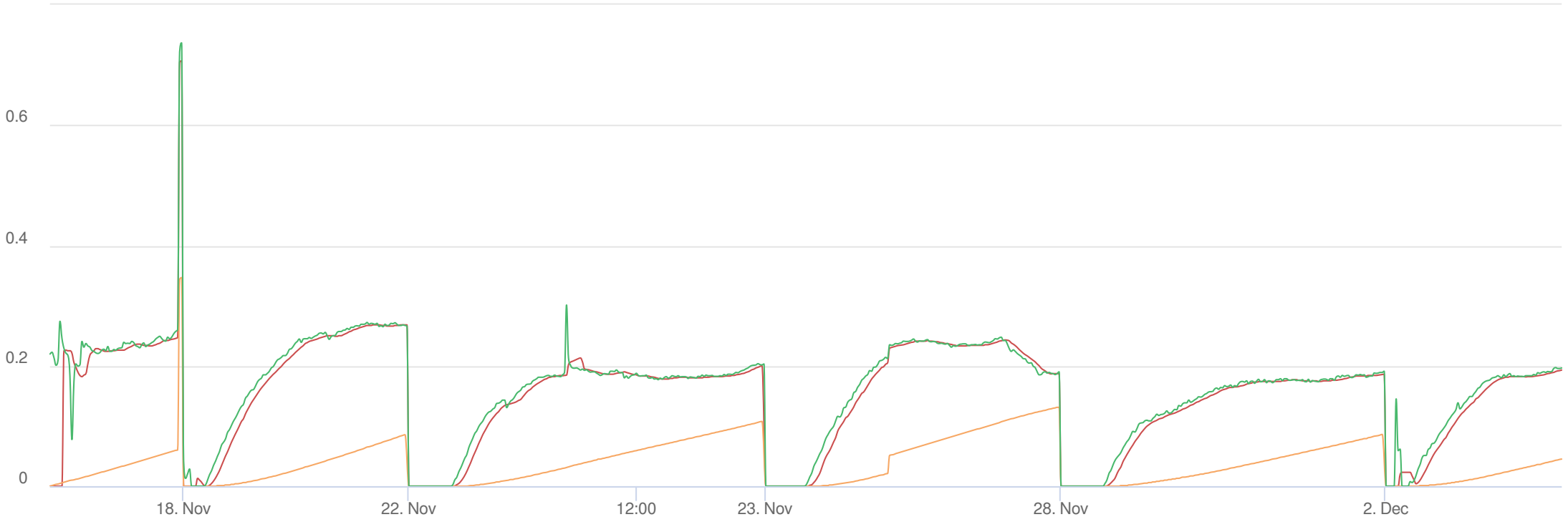
Total TWA mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0	0.001	0.009

Name	Crawford #1
S/N	0B327931
Description	FA04786
Location	35 Collier Rd, West Hurley, NY 12491, USA

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11/01/2022 10:20:00 – 12/07/2022 13:20:00
(GMT-05:00) Eastern Time (US & Canada)



VOC (STEL) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.151	0.707

VOC (TWA) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.038	0.347

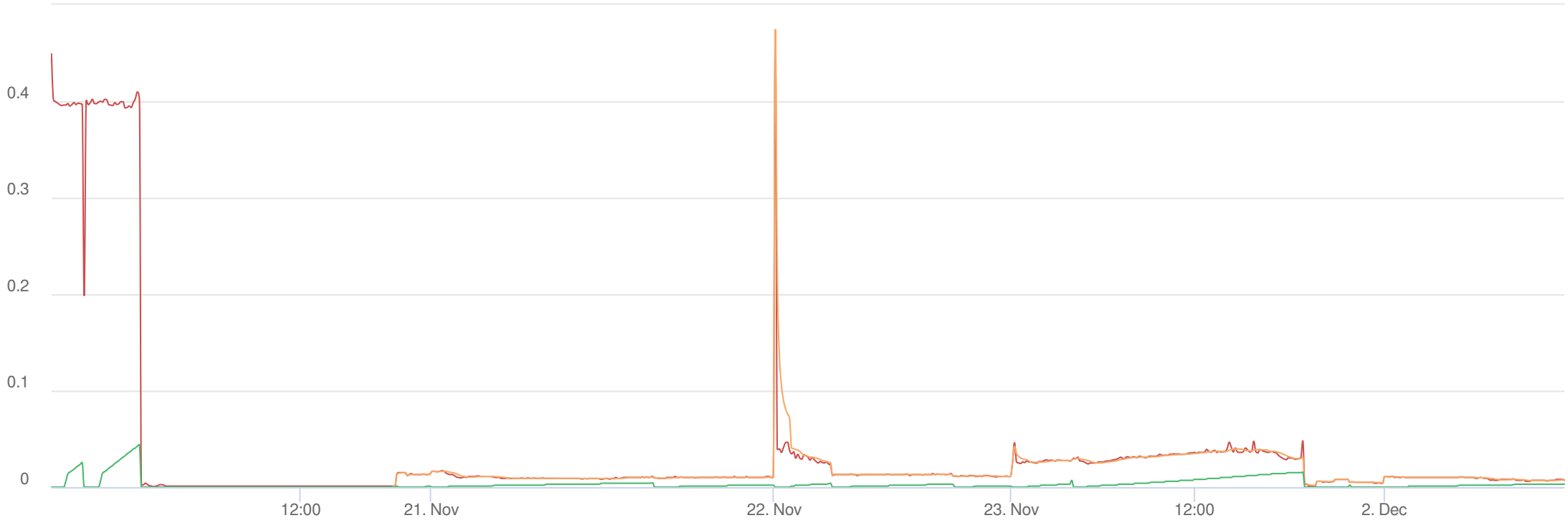
VOC ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.16	0.737

Name Crawford #1
S/N 0B327931
Description FA04786
Location 35 Collier Rd, West Hurley, NY 12491, USA

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11/01/2022 10:38:00 – 12/07/2022 13:38:00
(GMT-05:00) Eastern Time (US & Canada)



Mass Conc. Total mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0	0.037	0.492

Mass Conc. Total mg/m³ AVG 15m
mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0.001	0.018	0.474

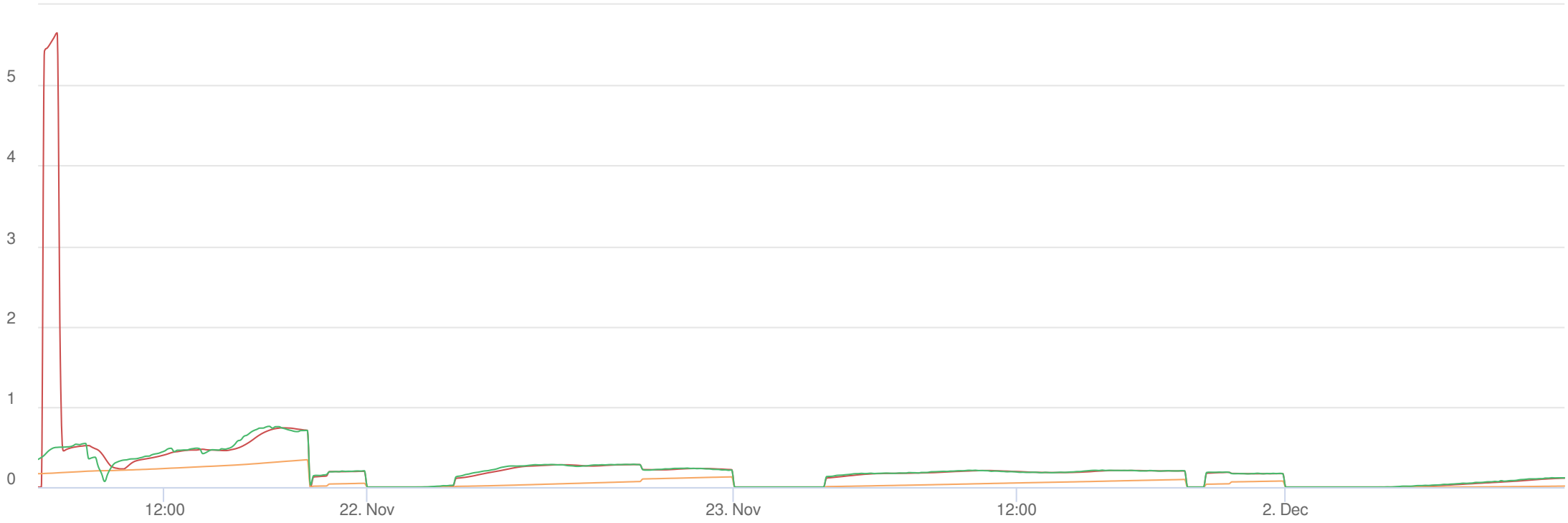
Total TWA mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0	0.003	0.044

Name	Crawford #2
S/N	0B443041
Description	FA03946
Location	1035 Dug Hill Rd, West Hurley, NY 12491, USA

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11/01/2022 10:38:00 – 12/07/2022 13:38:00
(GMT-05:00) Eastern Time (US & Canada)



VOC (STEL) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.248	5.659

VOC (TWA) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.071	0.34

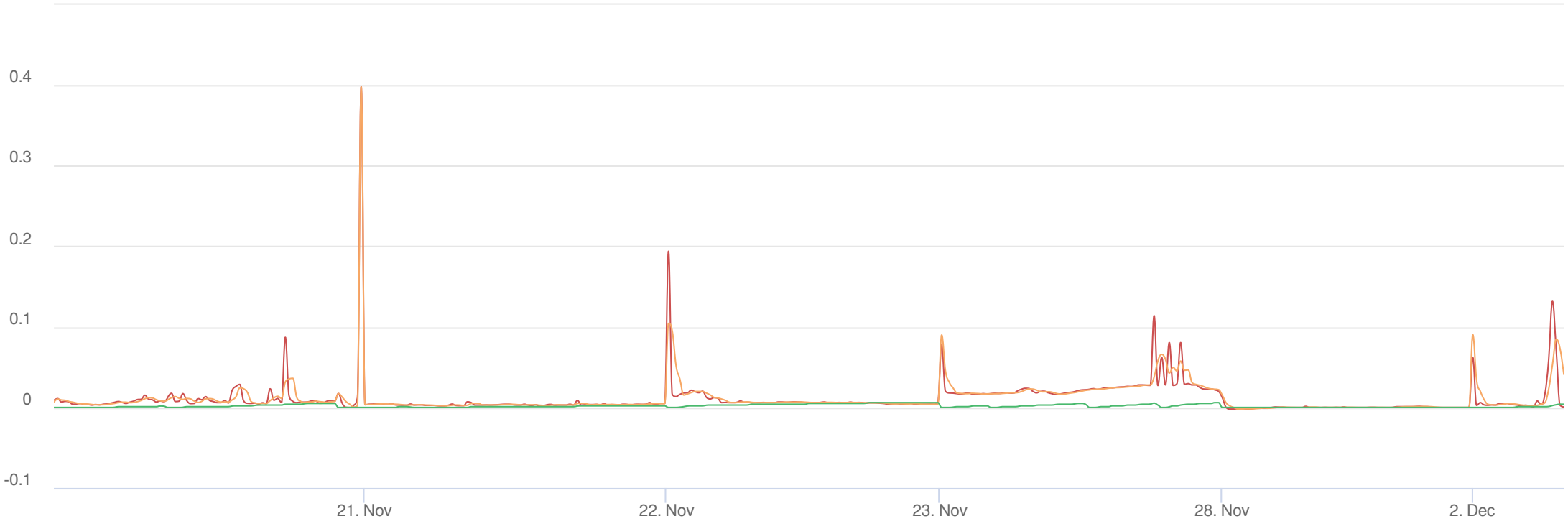
VOC ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.199	0.763

Name	Crawford #2
S/N	0B443041
Description	FA03946
Location	1035 Dug Hill Rd, West Hurley, NY 12491, USA

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11/01/2022 11:03:00 – 12/08/2022 14:03:00
(GMT-05:00) Eastern Time (US & Canada)



Mass Conc. Total mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
-0.002	0.01	0.398

Mass Conc. Total mg/m³ AVG 15m
mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
-0.002	0.0107	0.398

Total TWA mg/m³
DustTrak-8530
RS232(C)

MIN	AVG	MAX
0	0.002	0.006

Name Crawford #3
S/N 0B352750
Description FA04956
Location 35 Collier Rd, West Hurley, NY 12491, USA

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11/01/2022 11:03:00 – 12/08/2022 14:03:00
(GMT-05:00) Eastern Time (US & Canada)



VOC (STEL) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.135	8.491

VOC (TWA) ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.045	0.447

VOC ppm
miniRAE 3000
RS232(A)

MIN	AVG	MAX
0	0.072	0.796

Name	Crawford #3
S/N	0B352750
Description	FA04956
Location	35 Collier Rd, West Hurley, NY 12491, USA

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Crawford & Associates Engineering, and Land Surveying, P.C.

Table 1: Station 1 Dust Monitor - November 18, 2022 Data

Timestamp (America/New_York)	Guidance Value (VOC)	VOC ppm AVG 15m (ppm)	Guidance Value (Mass Conc.)	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/18/2022 7:46	5 ppm	---	0.1 mg/m3	---
11/18/2022 7:47	5 ppm	---	0.1 mg/m3	---
11/18/2022 7:48	5 ppm	---	0.1 mg/m3	0.110
11/18/2022 7:49	5 ppm	---	0.1 mg/m3	0.169
11/18/2022 7:50	5 ppm	---	0.1 mg/m3	0.1193
11/18/2022 7:51	5 ppm	---	0.1 mg/m3	0.1033
11/18/2022 7:52	5 ppm	---	0.1 mg/m3	0.0918
11/18/2022 7:53	5 ppm	0.042	0.1 mg/m3	0.0795
11/18/2022 7:54	5 ppm	0.028	0.1 mg/m3	0.0706
11/18/2022 7:55	5 ppm	0.0227	0.1 mg/m3	0.0638
11/18/2022 7:56	5 ppm	0.0225	0.1 mg/m3	0.0584
11/18/2022 7:57	5 ppm	0.0218	0.1 mg/m3	0.0543
11/18/2022 7:58	5 ppm	0.0277	0.1 mg/m3	0.0508
11/18/2022 7:59	5 ppm	0.0237	0.1 mg/m3	0.0479
11/18/2022 8:00	5 ppm	0.0208	0.1 mg/m3	0.0455
11/18/2022 8:01	5 ppm	0.0184	0.1 mg/m3	0.0434
11/18/2022 8:02	5 ppm	0.0166	0.1 mg/m3	0.0415
11/18/2022 8:03	5 ppm	0.0151	0.1 mg/m3	0.0353
11/18/2022 8:04	5 ppm	0.0138	0.1 mg/m3	0.0212
11/18/2022 8:05	5 ppm	0.0128	0.1 mg/m3	0.0209
11/18/2022 8:06	5 ppm	0.0119	0.1 mg/m3	0.0183
11/18/2022 8:07	5 ppm	0.0111	0.1 mg/m3	0.0163
11/18/2022 8:08	5 ppm	0.0083	0.1 mg/m3	0.0165
11/18/2022 8:09	5 ppm	0.0073	0.1 mg/m3	0.0165
11/18/2022 8:10	5 ppm	0.0065	0.1 mg/m3	0.0165
11/18/2022 8:11	5 ppm	0.0051	0.1 mg/m3	0.0165
11/18/2022 8:12	5 ppm	0.0038	0.1 mg/m3	0.0164
11/18/2022 8:13	5 ppm	0	0.1 mg/m3	0.0164
11/18/2022 8:14	5 ppm	---	0.1 mg/m3	0.0164
11/18/2022 8:15	5 ppm	0.0001	0.1 mg/m3	0.0164
11/18/2022 8:16	5 ppm	0.0007	0.1 mg/m3	0.0164
11/18/2022 8:17	5 ppm	0.0016	0.1 mg/m3	0.0164
11/18/2022 8:18	5 ppm	0.0028	0.1 mg/m3	0.0164
11/18/2022 8:19	5 ppm	0.0043	0.1 mg/m3	0.0164
11/18/2022 8:20	5 ppm	0.006	0.1 mg/m3	0.0164
11/18/2022 8:21	5 ppm	0.0079	0.1 mg/m3	0.0164
11/18/2022 8:22	5 ppm	0.0103	0.1 mg/m3	0.0164
11/18/2022 8:23	5 ppm	0.0129	0.1 mg/m3	0.016
11/18/2022 8:24	5 ppm	0.0158	0.1 mg/m3	0.016
11/18/2022 8:25	5 ppm	0.0188	0.1 mg/m3	0.016
11/18/2022 8:26	5 ppm	0.0222	0.1 mg/m3	0.016
11/18/2022 8:27	5 ppm	0.0259	0.1 mg/m3	0.016
11/18/2022 8:28	5 ppm	0.0299	0.1 mg/m3	0.016
11/18/2022 8:29	5 ppm	0.0319	0.1 mg/m3	0.016
11/18/2022 8:30	5 ppm	0.0362	0.1 mg/m3	0.016
11/18/2022 8:31	5 ppm	0.0403	0.1 mg/m3	0.016
11/18/2022 8:32	5 ppm	0.0444	0.1 mg/m3	0.0159
11/18/2022 8:33	5 ppm	0.0481	0.1 mg/m3	0.0159
11/18/2022 8:34	5 ppm	0.0517	0.1 mg/m3	0.0158
11/18/2022 8:35	5 ppm	0.0555	0.1 mg/m3	0.0157
11/18/2022 8:36	5 ppm	0.0595	0.1 mg/m3	0.0157
11/18/2022 8:37	5 ppm	0.0634	0.1 mg/m3	0.0162
11/18/2022 8:38	5 ppm	0.0672	0.1 mg/m3	0.0161
11/18/2022 8:39	5 ppm	0.0708	0.1 mg/m3	0.0161
11/18/2022 8:40	5 ppm	0.0747	0.1 mg/m3	0.016
11/18/2022 8:41	5 ppm	0.0783	0.1 mg/m3	0.0159
11/18/2022 8:42	5 ppm	0.0819	0.1 mg/m3	0.0159
11/18/2022 8:43	5 ppm	0.0855	0.1 mg/m3	0.0158
11/18/2022 8:44	5 ppm	0.0891	0.1 mg/m3	0.0157
11/18/2022 8:45	5 ppm	0.0922	0.1 mg/m3	0.0157
11/18/2022 8:46	5 ppm	0.0955	0.1 mg/m3	0.0156
11/18/2022 8:47	5 ppm	0.0987	0.1 mg/m3	0.0156
11/18/2022 8:48	5 ppm	0.1023	0.1 mg/m3	0.0156
11/18/2022 8:49	5 ppm	0.1057	0.1 mg/m3	0.0156
11/18/2022 8:50	5 ppm	0.1091	0.1 mg/m3	0.0156
11/18/2022 8:51	5 ppm	0.1122	0.1 mg/m3	0.0156
11/18/2022 8:52	5 ppm	0.1152	0.1 mg/m3	0.015
11/18/2022 8:53	5 ppm	---	0.1 mg/m3	---
11/18/2022 8:54	5 ppm	0.1204	0.1 mg/m3	0.015
11/18/2022 8:55	5 ppm	0.1237	0.1 mg/m3	---
11/18/2022 8:56	5 ppm	0.127	0.1 mg/m3	0.015
11/18/2022 8:57	5 ppm	0.1302	0.1 mg/m3	0.015
11/18/2022 8:58	5 ppm	0.1335	0.1 mg/m3	0.015
11/18/2022 8:59	5 ppm	0.1366	0.1 mg/m3	0.015
11/18/2022 9:00	5 ppm	0.1399	0.1 mg/m3	0.015
11/18/2022 9:01	5 ppm	0.1427	0.1 mg/m3	0.015
11/18/2022 9:02	5 ppm	0.1456	0.1 mg/m3	0.015
11/18/2022 9:03	5 ppm	0.148	0.1 mg/m3	0.0149
11/18/2022 9:04	5 ppm	0.1506	0.1 mg/m3	0.0148
11/18/2022 9:05	5 ppm	0.1531	0.1 mg/m3	0.0148
11/18/2022 9:06	5 ppm	0.156	0.1 mg/m3	0.0148
11/18/2022 9:07	5 ppm	0.1586	0.1 mg/m3	0.0148
11/18/2022 9:08	5 ppm	0.1597	0.1 mg/m3	0.0147
11/18/2022 9:09	5 ppm	0.1619	0.1 mg/m3	0.0147
11/18/2022 9:10	5 ppm	0.1641	0.1 mg/m3	0.0147
11/18/2022 9:11	5 ppm	0.1663	0.1 mg/m3	0.0147
11/18/2022 9:12	5 ppm	0.1685	0.1 mg/m3	0.0147
11/18/2022 9:13	5 ppm	0.1705	0.1 mg/m3	0.0147
11/18/2022 9:14	5 ppm	0.1723	0.1 mg/m3	0.0147
11/18/2022 9:15	5 ppm	0.1741	0.1 mg/m3	0.0147
11/18/2022 9:16	5 ppm	0.176	0.1 mg/m3	0.0147
11/18/2022 9:17	5 ppm	0.1777	0.1 mg/m3	0.0147
11/18/2022 9:18	5 ppm	0.1796	0.1 mg/m3	0.0147
11/18/2022 9:19	5 ppm	0.1816	0.1 mg/m3	0.0147
11/18/2022 9:20	5 ppm	0.1833	0.1 mg/m3	0.0146
11/18/2022 9:21	5 ppm	0.1851	0.1 mg/m3	0.0146
11/18/2022 9:22	5 ppm	0.1868	0.1 mg/m3	0.0146
11/18/2022 9:23	5 ppm	0.1884	0.1 mg/m3	0.0146
11/18/2022 9:24	5 ppm	0.1899	0.1 mg/m3	0.0145
11/18/2022 9:25	5 ppm	0.1919	0.1 mg/m3	0.0145
11/18/2022 9:26	5 ppm	0.1937	0.1 mg/m3	0.0145
11/18/2022 9:27	5 ppm	0.1953	0.1 mg/m3	0.0144
11/18/2022 9:28	5 ppm	0.1971	0.1 mg/m3	0.0143
11/18/2022 9:29	5 ppm	0.1991	0.1 mg/m3	0.0143
11/18/2022 9:30	5 ppm	0.2009	0.1 mg/m3	0.0142
11/18/2022 9:31	5 ppm	0.2026	0.1 mg/m3	0.0142
11/18/2022 9:32	5 ppm	0.2046	0.1 mg/m3	0.0141
11/18/2022 9:33	5 ppm	0.2065	0.1 mg/m3	0.0142
11/18/2022 9:34	5 ppm	0.208	0.1 mg/m3	0.0143
11/18/2022 9:35	5 ppm	0.2096	0.1 mg/m3	0.0143
11/18/2022 9:36	5 ppm	0.2109	0.1 mg/m3	0.0143
11/18/2022 9:37	5 ppm	0.2125	0.1 mg/m3	0.0143
11/18/2022 9:38	5 ppm	0.2143	0.1 mg/m3	0.0143
11/18/2022 9:39	5 ppm	0.216	0.1 mg/m3	0.0143
11/18/2022 9:40	5 ppm	0.2174	0.1 mg/m3	0.0142
11/18/2022 9:41	5 ppm	0.2187	0.1 mg/m3	0.0141
11/18/2022 9:42	5 ppm	0.2203	0.1 mg/m3	0.0141
11/18/2022 9:43	5 ppm	0.2217	0.1 mg/m3	0.0141
11/18/2022 9:44	5 ppm	0.2234	0.1 mg/m3	0.0141
11/18/2022 9:45	5 ppm	0.2249	0.1 mg/m3	0.0141
11/18/2022 9:46	5 ppm	0.2267	0.1 mg/m3	0.0139
11/18/2022 9:47	5 ppm	0.2283	0.1 mg/m3	0.0139
11/18/2022 9:48	5 ppm	0.2303	0.1 mg/m3	0.0138
11/18/2022 9:49	5 ppm	0.232	0.1 mg/m3	0.0137
11/18/2022 9:50	5 ppm	0.2335	0.1 mg/m3	0.0136
11/18/2022 9:51	5 ppm	0.2348	0.1 mg/m3	0.0135
11/18/2022 9:52	5 ppm	0.2361	0.1 mg/m3	0.0135
11/18/2022 9:53	5 ppm	0.2375	0.1 mg/m3	0.0134
11/18/2022 9:54	5 ppm	---	0.1 mg/m3	---
11/18/2022 9:55	5 ppm	0.2394	0.1 mg/m3	---
11/18/2022 9:56	5 ppm	0.2404	0.1 mg/m3	0.0134
11/18/2022 9:57	5 ppm	0.2413	0.1 mg/m3	0.0133
11/18/2022 9:58	5 ppm	0.2428	0.1 mg/m3	0.0132
11/18/2022 9:59	5 ppm	0.2431	0.1 mg/m3	0.0132
11/18/2022 10:00	5 ppm	0.2437	0.1 mg/m3	0.0132
11/18/2022 10:01	5 ppm	0.244	0.1 mg/m3	0.0132
11/18/2022 10:02	5 ppm	0.2445	0.1 mg/m3	0.0132
11/18/2022 10:03	5 ppm	0.2446	0.1 mg/m3	0.013
11/18/2022 10:04	5 ppm	0.245	0.1 mg/m3	0.0128
11/18/2022 10:05	5 ppm	0.2457	0.1 mg/m3	0.0128
11/18/2022 10:06	5 ppm	0.2466	0.1 mg/m3	0.0128
11/18/2022 10:07	5 ppm	0.2473	0.1 mg/m3	0.0128
11/18/2022 10:08	5 ppm	0.2479	0.1 mg/m3	0.0128
11/18/2022 10:09	5 ppm	0.2483	0.1 mg/m3	0.0129
11/18/2022 10:10	5 ppm	0.2487	0.1 mg/m3	0.0129
11/18/2022 10:11	5 ppm	0.2497	0.1 mg/m3	0.0129
11/18/2022 10:12	5 ppm	0.2499	0.1 mg/m3	0.0129
11/18/2022 10:13	5 ppm	0.2501	0.1 mg/m3	0.0129
11/18/2022 10:14	5 ppm	0.251	0.1 mg/m3	0.0129
11/18/2022 10:15	5 ppm	0.2517	0.1 mg/m3	0.0129
11/18/2022 10:16	5 ppm	0.2522	0.1 mg/m3	0.0131
11/18/2022 10:17	5 ppm	0.2522	0.1 mg/m3	0.0131
11/18/2022 10:18	5 ppm	0.2517	0.1 mg/m3	0.0139
11/18/2022 10:19	5 ppm	0.2517	0.1 mg/m3	0.014
11/18/2022 10:20	5 ppm	0.2517	0.1 mg/m3	0.014
11/18/2022 10:21	5 ppm	0.2514	0.1 mg/m3	0.014
11/18/2022 10:22	5 ppm	0.2512	0.1 mg/m3	0.014
11/18/2022 10:23	5 ppm	0.251	0.1 mg/m3	0.014
11/18/2022 10:24	5 ppm	0.2509	0.1 mg/m3	0.014
11/18/2022 10:25	5 ppm	0.2507	0.1 mg/m3	0.014
11/18/2022 10:26	5 ppm	0.2505	0.1 mg/m3	0.014
11/18/2022 10:27	5 ppm	0.2509	0.1 mg/m3	0.014
11/18/2022 10:28	5 ppm	0.2509	0.1 mg/m3	0.014
11/18/2022 10:29	5 ppm	0.2511	0.1 mg/m3	0.0139
11/18/2022 10:30	5 ppm	0.2512	0.1 mg/m3	0.0139
11/18/2022 10:31	5 ppm	0.2515	0.1 mg/m3	0.0136
11/18/2022 10:32	5 ppm	0.2521	0.1 mg/m3	0.0135
11/18/2022 10:33	5 ppm	0.2535	0.1 mg/m3	0.0127
11/18/2022 10:34	5 ppm	0.2542	0.1 mg/m3	0.0126
11/18/2022 10:35	5 ppm	0.2549	0.1 mg/m3	0.0125
11/18/2022 10:36	5 ppm	0.2559	0.1 mg/m3	0.0125
11/18/2022 10:37	5 ppm	0.2568	0.1 mg/m3	0.0124
11/18/2022 10:38	5 ppm	0.2574	0.1 mg/m3	0.0123
11/18/2022 10:39	5 ppm	0.258	0.1 mg/m3	0.0123
11/18/2022 10:40	5 ppm	0.259	0.1 mg/m3	0.0123
11/18/2022 10:41	5 ppm	0.2597	0.1 mg/m3	0.0122
11/18/2022 10:42	5 ppm	0.2603	0.1 mg/m3	0.0121
11/18/2022 10:43	5 ppm	0.2607	0.1 mg/m3	0.0121
11/18/2022 10:44	5 ppm	0.2611	0.1 mg/m3	0.0121
11/18/2022 10:45	5 ppm	0.2618	0.1 mg/m3	0.0121
11/18/2022 10:46	5 ppm	0.2625	0.1 mg/m3	0.0121
11/18/2022 10:47	5 ppm	0.2631	0.1 mg/m3	0.0121
11/18/2022 10:48	5 ppm	0.2635	0.1 mg/m3	0.0121
11/18/2022 10:49	5 ppm	0.2639	0.1 mg/m3	0.0121
11/18/2022 10:50	5 ppm	0.2643	0.1 mg/m3	0.0121
11/18/2022 10:51	5 ppm	0.2649	0.1 mg/m3	0.0121
11/18/2022 10:52	5 ppm	0.2654	0.1 mg/m3	0.0121
11/18/2022 10:53	5 ppm	0.266	0.1 mg/m3	0.0121
11/18/2022 10:54	5 ppm	0.2667	0.1 mg/m3	0.0121
11/18/2022 10:55	5 ppm	0.2669	0.1 mg/m3	0.012
11/18/2022 10:56	5 ppm	---	0.1 mg/m3	---
11/18/2022 10:57	5 ppm	0.2676	0.1 mg/m3	0.0119
11/18/2022 10:58	5 ppm	0.2679	0.1 mg/m3	0.0119
11/18/2022 10:59	5 ppm	0.2684	0.1 mg/m3	0.0119
11/18/2022 11:00	5 ppm	0.2686	0.1 mg/m3	0.0119
11/18/2022 11:01	5 ppm	0.2689	0.1 mg/m3	---
11/18/2022 11:02	5 ppm	0.2691	0.1 mg/m3	0.0119
11/18/2022 11:03	5 ppm	0.2693	0.1 mg/m3	0.0119
11/18/2022 11:04	5 ppm	0.2698	0.1 mg/m3	0.0119
11/18/2022 11:05	5 ppm	0.2698	0.1 mg/m3	0.0119
11/18/2022 11:06	5 ppm	0.2697	0.1 mg/m3	0.0119
11/18/2022 11:07	5 ppm	0.2699	0.1 mg/m3	0.0118
11/18/2022 11:08	5 ppm	0.2696	0.1 mg/m3	0.0118
11/18/2022 11:09	5 ppm	0.2691	0.1 mg/m3	0.0118
11/18/2022 11:10	5 ppm	0.2692	0.1 mg/m3	0.0118
11/18/2022 11:11	5 ppm	0.2689	0.1 mg/m3	0.0119
11/18/2022 11:12	5 ppm	0.2685	0.1 mg/m3	0.0119
11/18/2022 11:13	5 ppm	0.2683	0.1 mg/m3	0.0119
11/18/2022 11:14	5 ppm	0.2681	0.1 mg/m3	0.0119
11/18/2022 11:15	5 ppm	0.2681	0.1 mg/m3	0.0119
11/18/2022 11:16	5 ppm	0.2679	0.1 mg/m3	0.0119
11/18/2022 11:17	5 ppm	0.2677	0.1 mg/m3	0.0119
11/18/2022 11:18	5 ppm	0.2673	0.1 mg/m3	0.0119
11/18/2022 11:19	5 ppm	0.2673	0.1 mg/m3	0.0119
11/18/2022 11:20	5 ppm	0.2675	0.1 mg/m3	0.0119
11/18/2022 11:21	5 ppm	0.2675	0.1 mg/m3	0.0119
11/18/2022 11:22	5 ppm	0.2675	0.1 mg/m3	0.012
11/18/2022 11:23	5 ppm	0.2678	0.1 mg/m3	0.0119
11/18/2022 11:24	5 ppm	0.2683	0.1 mg/m3	0.0119
11/18/2022 11:25	5 ppm	0.2684	0.1 mg/m3	0.0118
11/18/2022 11:26	5 ppm	0.2687	0.1 mg/m3	0.0117
11/18/2022 11:27	5 ppm	0.2689	0.1 mg/m3	0.0117
11/18/2022 11:28	5 ppm	0.2691	0.1 mg/m3	0.0116
11/18/2022 11:29	5 ppm	0.269	0.1 mg/m3	0.0115
11/18/2022 11:30	5 ppm	0.2689	0.1 mg/m3	0.0115
11/18/2022 11:31	5 ppm	0.2687	0.1 mg/m3	0.0114
11/18/2022 11:32	5 ppm	0.2688	0.1 mg/m3	0.0113
11/18/2022 11:33	5 ppm	0.2691	0.1 mg/m3	0.0113
11/18/2022 11:34	5 ppm	0.2687	0.1 mg/m3	0.0112
11/18/2022 11:35	5 ppm	0.2687	0.1 mg/m3	0.0111
11/18/2022 11:36	5 ppm	0.2683	0.1 mg/m3	0.0115

Notes

Units

Results provided in:

VOC- ppm (parts per million)

Mass Conc- mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

VOC ppm AVG 15m (ppm)

Guidance Value (Mass Conc.)

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 2: Station 1 Dust Monitor - November 21, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/21/2022 7:43	5 ppm	---	0.1 mg/m3	---
11/21/2022 7:44	5 ppm	---	0.1 mg/m3	0.225
11/21/2022 7:45	5 ppm	---	0.1 mg/m3	0.2585
11/21/2022 7:46	5 ppm	---	0.1 mg/m3	0.1837
11/21/2022 7:47	5 ppm	---	0.1 mg/m3	0.146
11/21/2022 7:48	5 ppm	---	0.1 mg/m3	0.1234
11/21/2022 7:49	5 ppm	---	0.1 mg/m3	0.1088
11/21/2022 7:50	5 ppm	---	0.1 mg/m3	0.0979
11/21/2022 7:51	5 ppm	---	0.1 mg/m3	0.0896
11/21/2022 7:52	5 ppm	---	0.1 mg/m3	0.0833
11/21/2022 7:53	5 ppm	---	0.1 mg/m3	0.0785
11/21/2022 7:54	5 ppm	---	0.1 mg/m3	0.0746
11/21/2022 7:55	5 ppm	---	0.1 mg/m3	0.0711
11/21/2022 7:56	5 ppm	---	0.1 mg/m3	0.0682
11/21/2022 7:57	5 ppm	---	0.1 mg/m3	0.0656
11/21/2022 7:58	5 ppm	---	0.1 mg/m3	0.0634
11/21/2022 7:59	5 ppm	---	0.1 mg/m3	0.0505
11/21/2022 8:00	5 ppm	---	0.1 mg/m3	0.0331
11/21/2022 8:01	5 ppm	---	0.1 mg/m3	0.0331
11/21/2022 8:02	5 ppm	---	0.1 mg/m3	0.0331
11/21/2022 8:03	5 ppm	---	0.1 mg/m3	0.0331
11/21/2022 8:04	5 ppm	---	0.1 mg/m3	0.0328
11/21/2022 8:05	5 ppm	---	0.1 mg/m3	0.0327
11/21/2022 8:06	5 ppm	---	0.1 mg/m3	0.0327
11/21/2022 8:07	5 ppm	---	0.1 mg/m3	0.0325
11/21/2022 8:08	5 ppm	---	0.1 mg/m3	0.0322
11/21/2022 8:09	5 ppm	---	0.1 mg/m3	0.0319
11/21/2022 8:10	5 ppm	---	0.1 mg/m3	0.0317
11/21/2022 8:11	5 ppm	---	0.1 mg/m3	0.0315
11/21/2022 8:12	5 ppm	---	0.1 mg/m3	0.0313
11/21/2022 8:13	5 ppm	---	0.1 mg/m3	0.031
11/21/2022 8:14	5 ppm	---	0.1 mg/m3	0.0309
11/21/2022 8:15	5 ppm	---	0.1 mg/m3	0.0307
11/21/2022 8:16	5 ppm	---	0.1 mg/m3	0.0304
11/21/2022 8:17	5 ppm	---	0.1 mg/m3	0.0301
11/21/2022 8:18	5 ppm	---	0.1 mg/m3	0.0299
11/21/2022 8:19	5 ppm	---	0.1 mg/m3	0.0298
11/21/2022 8:20	5 ppm	---	0.1 mg/m3	0.0297
11/21/2022 8:21	5 ppm	---	0.1 mg/m3	0.0296
11/21/2022 8:22	5 ppm	---	0.1 mg/m3	0.0296
11/21/2022 8:23	5 ppm	---	0.1 mg/m3	0.0296
11/21/2022 8:24	5 ppm	---	0.1 mg/m3	0.0295
11/21/2022 8:25	5 ppm	---	0.1 mg/m3	0.0295
11/21/2022 8:26	5 ppm	---	0.1 mg/m3	0.0294
11/21/2022 8:27	5 ppm	---	0.1 mg/m3	0.0291
11/21/2022 8:28	5 ppm	---	0.1 mg/m3	0.0283
11/21/2022 8:29	5 ppm	---	0.1 mg/m3	0.0276
11/21/2022 8:30	5 ppm	---	0.1 mg/m3	0.0269
11/21/2022 8:31	5 ppm	---	0.1 mg/m3	0.0261
11/21/2022 8:32	5 ppm	---	0.1 mg/m3	0.0254
11/21/2022 8:33	5 ppm	---	0.1 mg/m3	0.0246
11/21/2022 8:34	5 ppm	---	0.1 mg/m3	0.0238
11/21/2022 8:35	5 ppm	---	0.1 mg/m3	0.0231
11/21/2022 8:36	5 ppm	---	0.1 mg/m3	0.0223
11/21/2022 8:37	5 ppm	---	0.1 mg/m3	0.0216
11/21/2022 8:38	5 ppm	---	0.1 mg/m3	0.0208
11/21/2022 8:39	5 ppm	---	0.1 mg/m3	0.0201
11/21/2022 8:40	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 8:41	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 8:42	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:43	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:44	5 ppm	---	0.1 mg/m3	---
11/21/2022 8:45	5 ppm	---	0.1 mg/m3	---
11/21/2022 8:46	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:47	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:48	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:49	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 8:50	5 ppm	---	0.1 mg/m3	0.0182
11/21/2022 8:51	5 ppm	---	0.1 mg/m3	0.0182
11/21/2022 8:52	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 8:53	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 8:54	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 8:55	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 8:56	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 8:57	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 8:58	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 8:59	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 9:00	5 ppm	---	0.1 mg/m3	0.0169
11/21/2022 9:01	5 ppm	---	0.1 mg/m3	0.0168
11/21/2022 9:02	5 ppm	---	0.1 mg/m3	0.0167
11/21/2022 9:03	5 ppm	---	0.1 mg/m3	0.0165
11/21/2022 9:04	5 ppm	---	0.1 mg/m3	0.0164
11/21/2022 9:05	5 ppm	---	0.1 mg/m3	0.0162
11/21/2022 9:06	5 ppm	---	0.1 mg/m3	0.0161
11/21/2022 9:07	5 ppm	---	0.1 mg/m3	0.0161
11/21/2022 9:08	5 ppm	---	0.1 mg/m3	0.0162
11/21/2022 9:09	5 ppm	---	0.1 mg/m3	0.0163
11/21/2022 9:10	5 ppm	---	0.1 mg/m3	0.0163
11/21/2022 9:11	5 ppm	---	0.1 mg/m3	0.0165
11/21/2022 9:12	5 ppm	---	0.1 mg/m3	0.0165
11/21/2022 9:13	5 ppm	---	0.1 mg/m3	0.0166
11/21/2022 9:14	5 ppm	---	0.1 mg/m3	0.0166
11/21/2022 9:15	5 ppm	---	0.1 mg/m3	0.0167
11/21/2022 9:16	5 ppm	---	0.1 mg/m3	0.0167
11/21/2022 9:17	5 ppm	---	0.1 mg/m3	0.0168
11/21/2022 9:18	5 ppm	---	0.1 mg/m3	0.0169
11/21/2022 9:19	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 9:20	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 9:21	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 9:22	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 9:23	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 9:24	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 9:25	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:26	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:27	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:28	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:29	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:30	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:31	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:32	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:33	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:34	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 9:35	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:36	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 9:37	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 9:38	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 9:39	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 9:40	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 9:41	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 9:42	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 9:43	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 9:44	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 9:45	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 9:46	5 ppm	---	0.1 mg/m3	---
11/21/2022 9:47	5 ppm	---	0.1 mg/m3	0.0169
11/21/2022 9:48	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 9:49	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 9:50	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 9:51	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 9:52	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 9:53	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 9:54	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 9:55	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:56	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 9:57	5 ppm	---	0.1 mg/m3	0.0178
11/21/2022 9:58	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 9:59	5 ppm	---	0.1 mg/m3	0.0181
11/21/2022 10:00	5 ppm	---	0.1 mg/m3	0.0181
11/21/2022 10:01	5 ppm	---	0.1 mg/m3	0.0182
11/21/2022 10:02	5 ppm	---	0.1 mg/m3	0.0184
11/21/2022 10:03	5 ppm	---	0.1 mg/m3	0.0185
11/21/2022 10:04	5 ppm	---	0.1 mg/m3	0.0185
11/21/2022 10:05	5 ppm	---	0.1 mg/m3	0.0186
11/21/2022 10:06	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 10:07	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 10:08	5 ppm	---	0.1 mg/m3	0.0188
11/21/2022 10:09	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 10:10	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 10:11	5 ppm	---	0.1 mg/m3	0.019
11/21/2022 10:12	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 10:13	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 10:14	5 ppm	---	0.1 mg/m3	0.0192
11/21/2022 10:15	5 ppm	---	0.1 mg/m3	0.0192
11/21/2022 10:16	5 ppm	---	0.1 mg/m3	0.0192
11/21/2022 10:17	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:18	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:19	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:20	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:21	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:22	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:23	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:24	5 ppm	---	0.1 mg/m3	0.0198
11/21/2022 10:25	5 ppm	---	0.1 mg/m3	0.0198
11/21/2022 10:26	5 ppm	---	0.1 mg/m3	0.0199
11/21/2022 10:27	5 ppm	---	0.1 mg/m3	0.0198
11/21/2022 10:28	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:29	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:30	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:31	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:32	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:33	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 10:34	5 ppm	---	0.1 mg/m3	0.0196
11/21/2022 10:35	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:36	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 10:37	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 10:38	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:39	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:40	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:41	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 10:42	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:43	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:44	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:45	5 ppm	---	0.1 mg/m3	0.0196
11/21/2022 10:46	5 ppm	---	0.1 mg/m3	0.0196
11/21/2022 10:47	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:47	5 ppm	---	0.1 mg/m3	---
11/21/2022 10:49	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 10:50	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 10:51	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 10:52	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:53	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:54	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:55	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:56	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 10:57	5 ppm	---	0.1 mg/m3	0.0192
11/21/2022 10:58	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 10:59	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 11:00	5 ppm	---	0.1 mg/m3	0.019
11/21/2022 11:01	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:02	5 ppm	---	0.1 mg/m3	0.0188
11/21/2022 11:03	5 ppm	---	0.1 mg/m3	0.0188
11/21/2022 11:04	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:05	5 ppm	---	0.1 mg/m3	0.0188
11/21/2022 11:06	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:07	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:08	5 ppm	---	0.1 mg/m3	0.019
11/21/2022 11:09	5 ppm	---	0.1 mg/m3	0.019
11/21/2022 11:10	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 11:11	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 11:12	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 11:13	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 11:14	5 ppm	---	0.1 mg/m3	0.0199
11/21/2022 11:15	5 ppm	---	0.1 mg/m3	0.0202
11/21/2022 11:16	5 ppm	---	0.1 mg/m3	0.0205
11/21/2022 11:17	5 ppm	---	0.1 mg/m3	0.0209
11/21/2022 11:18	5 ppm	---	0.1 mg/m3	0.0213
11/21/2022 11:19	5 ppm	---	0.1 mg/m3	0.0216
11/21/2022 11:20	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 11:21	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 11:22	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 11:23	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 11:24	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 11:25	5 ppm	---	0.1 mg/m3	0.0218
11/21/2022 11:26	5 ppm	---	0.1 mg/m3	0.0217
11/21/2022 11:27	5 ppm	---	0.1 mg/m3	0.0215
11/21/2022 11:28	5 ppm	---	0.1 mg/m3	0.0214
11/21/2022 11:29	5 ppm	---	0.1 mg/m3	0.0213
11/21/2022 11:30	5 ppm	---	0.1 mg/m3	0.0211
11/21/2022 11:31	5 ppm	---	0.1 mg/m3	0.0209
11/21/2022 11:32	5 ppm	---	0.1 mg/m3	0.0206
11/21/2022 11:33	5 ppm	---	0.1 mg/m3	0.0203
11/21/2022 11:34	5 ppm	---	0.1 mg/m3	0.0199
11/21/2022 11:35	5 ppm	---	0.1 mg/m3	0.0197
11/21/2022 11:36	5 ppm	---	0.1 mg/m3	0.0195
11/21/2022 11:37	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 11:38	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 11:39	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 11:40	5 ppm	---	0.1 mg/m3	0.0192
11/21/2022 11:41	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 11:42	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 11:43	5 ppm	---	0.1 mg/m3	0.019
11/21/2022 11:44	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:45	5 ppm	---	0.1 mg/m3	---
11/21/2022 11:46	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 11:47	5 ppm	---	0.1 mg/m3	0.0188
11/21/2022 11:48	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 11:49	5 ppm	---	0.1 mg/m3	---
11/21/2022 11:50	5 ppm	---	0.1 mg/m3	---
11/21/2022 11:51	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 11:52	5 ppm	---	0.1 mg/m3	0.0187
11/21/2022 11:53	5 ppm	---	0.1 mg/m3	0.0186
11/21/2022 11:54	5 ppm	---	0.1 mg/m3	0.0184
11/21/2022 11:55	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 11:56	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 11:57	5 ppm	---	0.1 mg/m3	0.0182
11/21/2022 11:58	5 ppm	---	0.1 mg/m3	0.0181
11/21/2022 11:59	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:00	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:01	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:02	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:03	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:04	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:05	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:06	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:07	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:08	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:09	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:10	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:11	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:12	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 12:13	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:14	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 12:15	5 ppm	---	0.1 mg/m3	0.0178
11/21/2022 12:16	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 12:17	5 ppm	---	0.1 mg/m3	0.0177
11/21/2022 12:18	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 12:19	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 12:20	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 12:21	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 12:22	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 12:23	5 ppm	---	0.1 mg/m3	0.0173
11/21/2022 12:24	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 12:25	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:26	5 ppm	---	0.1 mg/m3	---
11/21/2022 12:27	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:28	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:29	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:30	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:31	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:32	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:33	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:34	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:35	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:36	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:37	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:38	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:39	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:40	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:41	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:42	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:43	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:44	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:45	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:46	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 12:47	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:48	5 ppm	---	0.1 mg/m3	0.0169
11/21/2022 12:49	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:50	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:51	5 ppm	---	0.1 mg/m3	---
11/21/2022 12:52	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:53	5 ppm	---	0.1 mg/m3	0.017
11/21/2022 12:54	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:55	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:56	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:57	5 ppm	---	0.1 mg/m3	0.0171
11/21/2022 12:58	5 ppm	---	0.1 mg/m3	0.0172
11/21/2022 12:59	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 13:00	5 ppm	---	0.1 mg/m3	0.0174
11/21/2022 13:01	5 ppm	---	0.1 mg/m3	0.0175
11/21/2022 13:02	5 ppm	---	0.1 mg/m3	0.0176
11/21/2022 13:03	5 ppm	---	0.1 mg/m3	0.0178
11/21/2022 13:04	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 13:05	5 ppm	---	0.1 mg/m3	0.0179
11/21/2022 13:06	5 ppm	---	0.1 mg/m3	0.018
11/21/2022 13:07	5 ppm	---	0.1 mg/m3	0.0181
11/21/2022 13:08	5 ppm	---	0.1 mg/m3	0.0183
11/21/2022 13:09	5 ppm	---	0.1 mg/m3	0.0184
11/21/2022 13:10	5 ppm	---	0.1 mg/m3	---
11/21/2022 13:11	5 ppm	---	0.1 mg/m3	0.0189
11/21/2022 13:12	5 ppm	---	0.1 mg/m3	0.0191
11/21/2022 13:13	5 ppm	---	0.1 mg/m3	0.0193
11/21/2022 13:14	5 ppm	---	0.1 mg/m3	0.0194
11/21/2022 13:15	5 ppm	---	0.1 mg/m3	0.0196
11/21/2022 13:16	5 ppm	---	0.1 mg/m3	0.0196
11/21/2022 13:17	5 ppm	---	0.1 mg/m3	0.0198
11/21/2022 13:18	5 ppm	---	0.1 mg/m3	0.0199
11/21/2022 13:19	5 ppm	---	0.1 mg/m3	0.0201
11/21/2022 13:20	5 ppm	---	0.1 mg/m3	0.0201
11/21/2022 13:21	5 ppm	---	0.1 mg/m3	0.0203
11/21/2022 13:22	5 ppm	---	0.1 mg/m3	0.0205
11/21/2022 13:23	5 ppm	---	0.1 mg/m3	0.0206
11/21/2022 13:24	5 ppm	---	0.1 mg/m3	0.0207
11/21/2022 13:25	5 ppm	---	0.1 mg/m3	0.0207
11/21/2022 13:26	5 ppm	---	0.1 mg/m3	0.0207
11/21/2022 13:27	5 ppm	---	0.1 mg/m3	0.0206
11/21/2022 13:28	5 ppm	---	0.1 mg/m3	0.0206
11/21/2022 13:29	5 ppm	---	0.1 mg/m3	0.0206
11/21/2022 13:30	5 ppm	---	0.1 mg/m3	0.0207
11/21/2022 13:31	5 ppm	---	0.1 mg/m3	0.0209
11/21/2022 13:32	5 ppm	---	0.1 mg/m3	0.021
11/21/2022 13:33	5 ppm	---	0.1 mg/m3	0.0212
11/21/2022 13:34	5 ppm	---	0.1 mg/m3	0.0213
11/21/2022 13:35	5 ppm	---	0.1 mg/m3	0.0214
11/21/2022 13:36	5 ppm	---	0.1 mg/m3	0.0215
11/21/2022 13:37	5 ppm	---	0.1 mg/m3	0.0215
11/21/2022 13:38	5 ppm	---	0.1 mg/m3	0.0215
11/21/2022 13:39	5 ppm	---	0.1 mg/m3	0.0215
11/21/2022 13:40	5 ppm	---	0.1 mg/m3	0.0216
11/21/2022 13:41	5 ppm	---	0.1 mg/m3	0.0217
11/21/2022 13:42	5 ppm	---	0.1 mg/m3	0.0218
11/21/2022 13:43	5 ppm	---	0.1 mg/m3	0.0219
11/21/2022 13:44	5 ppm	---	0.1 mg/m3	0.0219
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Crawford & Associates Engineering, and Land Surveying, P.C.

Table 3: Station 1 Dust Monitor - November 23, 2022

Datetamp (America/New_York)	Guidance Values	VOC ppm AVG 15m (ppm)	Guidance Values	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/23/2022 7:37	5 ppm	0	0.1 mg/m3	0.09
11/23/2022 7:38	5 ppm	0	0.1 mg/m3	0.06
11/23/2022 7:39	5 ppm	0	0.1 mg/m3	0.05
11/23/2022 7:40	5 ppm	0	0.1 mg/m3	0.04
11/23/2022 7:41	5 ppm	0	0.1 mg/m3	0.04
11/23/2022 7:42	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:43	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:44	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:45	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:46	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:47	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:48	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:49	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:50	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:51	5 ppm	0	0.1 mg/m3	0.03
11/23/2022 7:52	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:53	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:54	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:55	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 7:56	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:57	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:58	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 7:59	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:00	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:01	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:02	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:03	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:04	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:05	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:06	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:07	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:08	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:09	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:10	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:11	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:12	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:13	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:14	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:15	5 ppm	0	0.1 mg/m3	0.02
11/23/2022 8:16	5 ppm	0.0001	0.1 mg/m3	0.02
11/23/2022 8:17	5 ppm	0.0002	0.1 mg/m3	0.02
11/23/2022 8:18	5 ppm	0.0007	0.1 mg/m3	0.02
11/23/2022 8:19	5 ppm	0.0012	0.1 mg/m3	0.02
11/23/2022 8:20	5 ppm	0.0021	0.1 mg/m3	0.02
11/23/2022 8:21	5 ppm	0.0033	0.1 mg/m3	0.02
11/23/2022 8:22	5 ppm	0.0046	0.1 mg/m3	0.02
11/23/2022 8:23	5 ppm	0.0062	0.1 mg/m3	0.02
11/23/2022 8:24	5 ppm	0.0082	0.1 mg/m3	0.02
11/23/2022 8:25	5 ppm	0.0106	0.1 mg/m3	0.02
11/23/2022 8:26	5 ppm	0.013	0.1 mg/m3	0.02
11/23/2022 8:27	5 ppm	0.0159	0.1 mg/m3	0.02
11/23/2022 8:28	5 ppm	0.0188	0.1 mg/m3	0.02
11/23/2022 8:29	5 ppm	0.0221	0.1 mg/m3	0.02
11/23/2022 8:30	5 ppm	0.0257	0.1 mg/m3	0.02
11/23/2022 8:31	5 ppm	0.0292	0.1 mg/m3	0.02
11/23/2022 8:32	5 ppm	0.0329	0.1 mg/m3	0.02
11/23/2022 8:33	5 ppm	0.0366	0.1 mg/m3	0.02
11/23/2022 8:34	5 ppm	0.0407	0.1 mg/m3	0.02
11/23/2022 8:35	5 ppm	0.0445	0.1 mg/m3	0.02
11/23/2022 8:36	5 ppm	0.0483	0.1 mg/m3	0.02
11/23/2022 8:37	5 ppm	0.0525	0.1 mg/m3	0.02
11/23/2022 8:38	5 ppm	---	0.1 mg/m3	---
11/23/2022 8:39	5 ppm	0.0584	0.1 mg/m3	0.02
11/23/2022 8:40	5 ppm	0.0624	0.1 mg/m3	0.02
11/23/2022 8:41	5 ppm	0.0663	0.1 mg/m3	0.02
11/23/2022 8:42	5 ppm	0.0701	0.1 mg/m3	0.03
11/23/2022 8:43	5 ppm	0.0737	0.1 mg/m3	0.04
11/23/2022 8:44	5 ppm	0.0772	0.1 mg/m3	0.05
11/23/2022 8:45	5 ppm	0.0806	0.1 mg/m3	0.06
11/23/2022 8:46	5 ppm	0.0848	0.1 mg/m3	0.06
11/23/2022 8:47	5 ppm	0.0883	0.1 mg/m3	0.06
11/23/2022 8:48	5 ppm	0.092	0.1 mg/m3	0.07
11/23/2022 8:49	5 ppm	0.0954	0.1 mg/m3	0.07
11/23/2022 8:50	5 ppm	0.0986	0.1 mg/m3	0.08
11/23/2022 8:51	5 ppm	0.1015	0.1 mg/m3	0.08
11/23/2022 8:52	5 ppm	0.104	0.1 mg/m3	0.08
11/23/2022 8:53	5 ppm	0.1051	0.1 mg/m3	0.07
11/23/2022 8:54	5 ppm	0.1078	0.1 mg/m3	0.07
11/23/2022 8:55	5 ppm	0.1107	0.1 mg/m3	0.08
11/23/2022 8:56	5 ppm	0.1134	0.1 mg/m3	0.08
11/23/2022 8:57	5 ppm	0.1158	0.1 mg/m3	0.17
11/23/2022 8:58	5 ppm	0.1188	0.1 mg/m3	0.17
11/23/2022 8:59	5 ppm	0.1215	0.1 mg/m3	0.17
11/23/2022 9:00	5 ppm	0.1243	0.1 mg/m3	0.17
11/23/2022 9:01	5 ppm	0.1263	0.1 mg/m3	0.17
11/23/2022 9:02	5 ppm	0.1287	0.1 mg/m3	0.17
11/23/2022 9:03	5 ppm	0.1309	0.1 mg/m3	0.16
11/23/2022 9:04	5 ppm	0.1335	0.1 mg/m3	0.16
11/23/2022 9:05	5 ppm	0.1361	0.1 mg/m3	0.15
11/23/2022 9:06	5 ppm	0.139	0.1 mg/m3	0.15
11/23/2022 9:07	5 ppm	0.1416	0.1 mg/m3	0.17
11/23/2022 9:08	5 ppm	0.1443	0.1 mg/m3	0.18
11/23/2022 9:09	5 ppm	0.1471	0.1 mg/m3	0.18
11/23/2022 9:10	5 ppm	0.1493	0.1 mg/m3	0.17
11/23/2022 9:11	5 ppm	0.1519	0.1 mg/m3	0.17
11/23/2022 9:12	5 ppm	0.1548	0.1 mg/m3	0.08
11/23/2022 9:13	5 ppm	0.1573	0.1 mg/m3	0.07
11/23/2022 9:14	5 ppm	0.1599	0.1 mg/m3	0.05
11/23/2022 9:15	5 ppm	0.1623	0.1 mg/m3	0.05
11/23/2022 9:16	5 ppm	0.165	0.1 mg/m3	0.05
11/23/2022 9:17	5 ppm	0.1677	0.1 mg/m3	0.05
11/23/2022 9:18	5 ppm	0.1703	0.1 mg/m3	0.05
11/23/2022 9:19	5 ppm	0.1723	0.1 mg/m3	0.05
11/23/2022 9:20	5 ppm	0.1746	0.1 mg/m3	0.05
11/23/2022 9:21	5 ppm	0.177	0.1 mg/m3	0.05
11/23/2022 9:22	5 ppm		0.1 mg/m3	0.03
11/23/2022 9:23	5 ppm	0.1805	0.1 mg/m3	0.02
11/23/2022 9:24	5 ppm	0.1826	0.1 mg/m3	0.02
11/23/2022 9:25	5 ppm	0.1848	0.1 mg/m3	0.02
11/23/2022 9:26	5 ppm	0.1866	0.1 mg/m3	0.02
11/23/2022 9:27	5 ppm	0.1884	0.1 mg/m3	0.02
11/23/2022 9:28	5 ppm	0.1903	0.1 mg/m3	0.02
11/23/2022 9:29	5 ppm	0.1919	0.1 mg/m3	0.02
11/23/2022 9:30	5 ppm	0.1938	0.1 mg/m3	0.02
11/23/2022 9:31	5 ppm	0.1957	0.1 mg/m3	0.02
11/23/2022 9:32	5 ppm	0.1974	0.1 mg/m3	0.02
11/23/2022 9:33	5 ppm	0.1992	0.1 mg/m3	0.03
11/23/2022 9:34	5 ppm	0.201	0.1 mg/m3	0.03
11/23/2022 9:35	5 ppm	0.2026	0.1 mg/m3	0.03
11/23/2022 9:36	5 ppm	0.204	0.1 mg/m3	0.03
11/23/2022 9:37	5 ppm	0.2047	0.1 mg/m3	0.03
11/23/2022 9:38	5 ppm	0.2061	0.1 mg/m3	0.03
11/23/2022 9:39	5 ppm	---	0.1 mg/m3	---
11/23/2022 9:40	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:41	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:42	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:43	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:44	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:45	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:46	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:47	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:48	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:49	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:50	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:51	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:52	5 ppm	---	0.1 mg/m3	0.03
11/23/2022 9:53	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:54	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:55	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:56	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:57	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:58	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 9:59	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:00	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:01	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:02	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:03	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:04	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:05	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:06	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:07	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:08	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:09	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:10	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:11	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:12	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:13	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:14	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:15	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:16	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:17	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:18	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:19	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:20	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:21	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:22	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:23	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:24	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:25	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:26	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:27	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:28	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:29	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:30	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:31	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:32	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:33	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:34	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:35	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:36	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:37	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:38	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:39	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:40	5 ppm	---	0.1 mg/m3	0.02
11/23/2022 10:41	5 ppm	---	0.1 mg/m3	---
11/23/2022 10:42	5 ppm	0.234	0.1 mg/m3	0.02
11/23/2022 10:43	5 ppm	0.235	0.1 mg/m3	0.02
11/23/2022 10:44	5 ppm	0.235	0.1 mg/m3	0.02
11/23/2022 10:45	5 ppm	0.2345	0.1 mg/m3	0.02
11/23/2022 10:46	5 ppm	0.2346	0.1 mg/m3	0.02
11/23/2022 10:47	5 ppm	0.2347	0.1 mg/m3	0.02
11/23/2022 10:48	5 ppm	0.235	0.1 mg/m3	0.02
11/23/2022 10:49	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 10:50	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 10:51	5 ppm	0.2355	0.1 mg/m3	0.03
11/23/2022 10:52	5 ppm	0.2357	0.1 mg/m3	0.03
11/23/2022 10:53	5 ppm	0.2358	0.1 mg/m3	0.03
11/23/2022 10:54	5 ppm	0.236	0.1 mg/m3	0.03
11/23/2022 10:55	5 ppm	0.2362	0.1 mg/m3	0.03
11/23/2022 10:56	5 ppm	0.2367	0.1 mg/m3	0.03
11/23/2022 10:57	5 ppm	0.237	0.1 mg/m3	0.03
11/23/2022 10:58	5 ppm	0.2374	0.1 mg/m3	0.03
11/23/2022 10:59	5 ppm	0.2377	0.1 mg/m3	0.03
11/23/2022 11:00	5 ppm	0.2381	0.1 mg/m3	0.03
11/23/2022 11:01	5 ppm	0.2385	0.1 mg/m3	0.03
11/23/2022 11:02	5 ppm	0.2389	0.1 mg/m3	0.03
11/23/2022 11:03	5 ppm	0.2392	0.1 mg/m3	0.03
11/23/2022 11:04	5 ppm	0.2395	0.1 mg/m3	0.03
11/23/2022 11:05	5 ppm	0.24	0.1 mg/m3	0.03
11/23/2022 11:06	5 ppm	0.2405	0.1 mg/m3	0.03
11/23/2022 11:07	5 ppm	0.2409	0.1 mg/m3	0.03
11/23/2022 11:08	5 ppm	0.2412	0.1 mg/m3	0.03
11/23/2022 11:09	5 ppm	0.2414	0.1 mg/m3	0.03
11/23/2022 11:10	5 ppm	0.2415	0.1 mg/m3	0.03
11/23/2022 11:11	5 ppm	0.2412	0.1 mg/m3	0.03
11/23/2022 11:12	5 ppm	0.2415	0.1 mg/m3	0.03
11/23/2022 11:13	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:14	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:15	5 ppm	0.2415	0.1 mg/m3	0.03
11/23/2022 11:16	5 ppm	0.2415	0.1 mg/m3	0.03
11/23/2022 11:17	5 ppm	0.2416	0.1 mg/m3	0.03
11/23/2022 11:18	5 ppm	0.2417	0.1 mg/m3	0.03
11/23/2022 11:19	5 ppm	0.2417	0.1 mg/m3	0.03
11/23/2022 11:20	5 ppm	0.2418	0.1 mg/m3	0.03
11/23/2022 11:21	5 ppm	0.2417	0.1 mg/m3	0.03
11/23/2022 11:22	5 ppm	0.2414	0.1 mg/m3	0.03
11/23/2022 11:23	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:24	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:25	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:26	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:27	5 ppm	0.2412	0.1 mg/m3	0.03
11/23/2022 11:28	5 ppm	0.2411	0.1 mg/m3	0.03
11/23/2022 11:29	5 ppm	0.2413	0.1 mg/m3	0.03
11/23/2022 11:30	5 ppm	0.241	0.1 mg/m3	0.03
11/23/2022 11:31	5 ppm	0.2407	0.1 mg/m3	0.03
11/23/2022 11:32	5 ppm	0.2403	0.1 mg/m3	0.03
11/23/2022 11:33	5 ppm	0.24	0.1 mg/m3	0.03
11/23/2022 11:34	5 ppm	0.2397	0.1 mg/m3	0.03
11/23/2022 11:35	5 ppm	0.2392	0.1 mg/m3	0.03
11/23/2022 11:36	5 ppm	0.2389	0.1 mg/m3	0.03
11/23/2022 11:37	5 ppm	0.2385	0.1 mg/m3	0.03
11/23/2022 11:38	5 ppm	0.2383	0.1 mg/m3	0.03
11/23/2022 11:39	5 ppm	0.238	0.1 mg/m3	0.03
11/23/2022 11:40	5 ppm	0.2379	0.1 mg/m3	0.03
11/23/2022 11:41	5 ppm	0.2376	0.1 mg/m3	0.03
11/23/2022 11:42	5 ppm	0.2373	0.1 mg/m3	0.03
11/23/2022 11:42	5 ppm		0.1 mg/m3	
11/23/2022 11:43	5 ppm	0.2368	0.1 mg/m3	
11/23/2022 11:44	5 ppm	0.2361	0.1 mg/m3	0.03
11/23/2022 11:45	5 ppm	0.2356	0.1 mg/m3	0.03
11/23/2022 11:46	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 11:47	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 11:48	5 ppm	0.2351	0.1 mg/m3	0.03
11/23/2022 11:49	5 ppm	0.2346	0.1 mg/m3	0.03
11/23/2022 11:50	5 ppm	0.2343	0.1 mg/m3	0.03
11/23/2022 11:51	5 ppm	0.2341	0.1 mg/m3	0.03
11/23/2022 11:52	5 ppm	0.234	0.1 mg/m3	0.03
11/23/2022 11:53	5 ppm	0.234	0.1 mg/m3	0.03
11/23/2022 11:54	5 ppm	0.2339	0.1 mg/m3	0.03
11/23/2022 11:55	5 ppm	0.2338	0.1 mg/m3	0.03
11/23/2022 11:56	5 ppm	0.2338	0.1 mg/m3	0.03
11/23/2022 11:57	5 ppm	0.2339	0.1 mg/m3	0.03
11/23/2022 11:58	5 ppm	0.2343	0.1 mg/m3	0.03
11/23/2022 11:59	5 ppm	0.2347	0.1 mg/m3	0.03
11/23/2022 12:00	5 ppm	0.2348	0.1 mg/m3	0.03
11/23/2022 12:01	5 ppm	0.235	0.1 mg/m3	0.03
11/23/2022 12:02	5 ppm	0.235	0.1 mg/m3	0.03
11/23/2022 12:03	5 ppm	0.2348	0.1 mg/m3	0.03
11/23/2022 12:04	5 ppm	0.2352	0.1 mg/m3	0.03
11/23/2022 12:05	5 ppm	0.2352	0.1 mg/m3	0.03
11/23/2022 12:06	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 12:07	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 12:08	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 12:09	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 12:10	5 ppm	0.2353	0.1 mg/m3	0.03
11/23/2022 12:11	5 ppm	0.2351	0.1 mg/m3	0.03
11/23/2022 12:12	5 ppm	0.2349	0.1 mg/m3	0.03
11/23/2022 12:13	5 ppm	0.2348	0.1 mg/m3	0.03
11/23/2022 12:14	5 ppm	0.2347	0.1 mg/m3	0.03
11/23/2022 12:15	5 ppm	0.2348	0.1 mg/m3	0.03
11/23/2022 12:16	5 ppm	0.235	0.1 mg/m3	0.03
11/23/2022 12:17	5 ppm	0.2352	0.1 mg/m3	0.03
11/23/2022 12:18	5 ppm	0.2357	0.1 mg/m3	0.03
11/23/2022 12:19	5 ppm	0.2359	0.1 mg/m3	0.03
11/23/2022 12:20	5 ppm	0.2363	0.1 mg/m3	0.03
11/23/2022 12:21	5 ppm	0.2365	0.1 mg/m3	0.03
11/23/2022 12:22	5 ppm	0.2367	0.1 mg/m3	0.03
11/23/2022 12:23	5 ppm	0.2369	0.1 mg/m3	0.03
11/23/2022 12:24	5 ppm	0.2371	0.1 mg/m3	0.03
11/23/2022 12:25	5 ppm	0.2375	0.1 mg/m3	0.03
11/23/2022 12:26	5 ppm	0.2381	0.1 mg/m3	0.03
11/23/2022 12:27	5 ppm	0.2387	0.1 mg/m3	0.03
11/23/2022 12:28	5 ppm	0.2393	0.1 mg/m3	0.03
11/23/2022 12:29	5 ppm	0.2399	0.1 mg/m3	0.03
11/23/2022 12:30	5 ppm	0.2405	0.1 mg/m3	0.03
11/23/2022 12:31	5 ppm	0.241	0.1 mg/m3	0.03
11/23/2022 12:32	5 ppm	0.2417	0.1 mg/m3	0.03
11/23/2022 12:33	5 ppm	0.2421	0.1 mg/m3	0.03
11/23/2022 12:34	5 ppm	0.2427	0.1 mg/m3	0.03
11/23/2022 12:35	5 ppm	0.2431	0.1 mg/m3	0.03
11/23/2022 12:36	5 ppm	0.2433	0.1 mg/m3	0.03
11/23/2022 12:37	5 ppm	0.2437	0.1 mg/m3	0.03
11/23/2022 12:38	5 ppm	0.2439	0.1 mg/m3	0.03
11/23/2022 12:39	5 ppm	0.2441	0.1 mg/m3	0.03
11/23/2022 12:40	5 ppm	0.2439	0.1 mg/m3	0.04
11/23/2022 12:41	5 ppm	0.2434	0.1 mg/m3	0.04
11/23/2022 12:42	5 ppm	0.2426	0.1 mg/m3	0.05
11/23/2022 12:43	5 ppm	0.2413	0.1 mg/m3	0.06
11/23/2022 12:45	5 ppm	0.2396	0.1 mg/m3	---
11/23/2022 12:46	5 ppm	0.2384	0.1 mg/m3	0.06
11/23/2022 12:47	5 ppm	0.2368	0.1 mg/m3	0.06
11/23/2022 12:48	5 ppm	0.2353	0.1 mg/m3	0.06
11/23/2022 12:49	5 ppm	0.2335	0.1 mg/m3	0.06
11/23/2022 12:50	5 ppm	0.2319	0.1 mg/m3	0.06
11/23/2022 12:51	5 ppm	0.2302	0.1 mg/m3	0.06
11/23/2022 12:52	5 ppm	0.2284	0.1 mg/m3	0.06
11/23/2022 12:53	5 ppm	0.2266	0.1 mg/m3	0.06
11/23/2022 12:54	5 ppm	0.2248	0.1 mg/m3	0.06
11/23/2022 12:55	5 ppm	0.2231	0.1 mg/m3	0.06
11/23/2022 12:56	5 ppm	0.2217	0.1 mg/m3	0.05
11/23/2022 12:57	5 ppm	0.2202	0.1 mg/m3	0.04
11/23/2022 12:58	5 ppm	0.2192	0.1 mg/m3	0.03
11/23/2022 12:59	5 ppm	0.2187	0.1 mg/m3	0.03
11/23/2022 13:00	5 ppm	0.2175	0.1 mg/m3	0.03
11/23/2022 13:01	5 ppm	0.2161	0.1 mg/m3	0.03
11/23/2022 13:02	5 ppm	0.2148	0.1 mg/m3	0.03
11/23/2022 13:03	5 ppm	0.2134	0.1 mg/m3	0.03
11/23/2022 13:04	5 ppm	0.2122	0.1 mg/m3	---
11/23/2022 13:05	5 ppm	0.2109	0.1 mg/m3	0.03
11/23/2022 13:06	5 ppm	0.2098	0.1 mg/m3	0.03
11/23/2022 13:07	5 ppm	0.2085	0.1 mg/m3	0.04
11/23/2022 13:08	5 ppm	0.207	0.1 mg/m3	0.04
11/23/2022 13:09	5 ppm	0.2059	0.1 mg/m3	0.04
11/23/2022 13:10	5 ppm	0.2044	0.1 mg/m3	0.04
11/23/2022 13:11	5 ppm	0.2025	0.1 mg/m3	0.04
11/23/2022 13:12	5 ppm	0.2009	0.1 mg/m3	0.04
11/23/2022 13:13	5 ppm	0.1991	0.1 mg/m3	0.04
11/23/2022 13:14	5 ppm	0.1972	0.1 mg/m3	0.04
11/23/2022 13:15	5 ppm	0.1959	0.1 mg/m3	0.04
11/23/2022 13:16	5 ppm	0.1947	0.1 mg/m3	0.04
11/23/2022 13:17	5 ppm	0.1937	0.1 mg/m3	0.04
11/23/2022 13:18	5 ppm	0.1929	0.1 mg/m3	0.04
11/23/2022 13:19	5 ppm	0.1917	0.1 mg/m3	0.04
11/23/2022 13:20	5 ppm	0.1909	0.1 mg/m3	0.04
11/23/2022 13:21	5 ppm	0.1898	0.1 mg/m3	0.04
11/23/2022 13:22	5 ppm	0.1892	0.1 mg/m3	0.04
11/23/2022 13:23	5 ppm	0.1887	0.1 m

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 4: Station 1 Dust Monitor - November 28, 2022 Data

Timestamp (America/New_York)	Guidance Value	Mass Conc. Total (mg/m³)	Guidance Value	VOC ppm AVG 15m (ppm)	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/28/2022 8:05	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 8:06	5 ppm	0.1	0.1 mg/m3	0.00	0.085
11/28/2022 8:07	5 ppm	0.0	0.1 mg/m3	0.00	0.0455
11/28/2022 8:08	5 ppm	0.0	0.1 mg/m3	0.00	0.0353
11/28/2022 8:09	5 ppm	0.0	0.1 mg/m3	0.00	0.0275
11/28/2022 8:10	5 ppm	0.0	0.1 mg/m3	0.00	0.0222
11/28/2022 8:11	5 ppm	0.0	0.1 mg/m3	0.00	0.0188
11/28/2022 8:12	5 ppm	0.0	0.1 mg/m3	0.00	0.0163
11/28/2022 8:13	5 ppm	0.0	0.1 mg/m3	0.00	0.0143
11/28/2022 8:14	5 ppm	0.0	0.1 mg/m3	0.00	0.0128
11/28/2022 8:15	5 ppm	0.0	0.1 mg/m3	0.00	0.0115
11/28/2022 8:16	5 ppm	0.0	0.1 mg/m3	---	0.0105
11/28/2022 8:17	5 ppm	0.0	0.1 mg/m3	0.00	0.0096
11/28/2022 8:18	5 ppm	0.0	0.1 mg/m3	0.00	0.0088
11/28/2022 8:19	5 ppm	0.0	0.1 mg/m3	0.00	0.0082
11/28/2022 8:20	5 ppm	0.0	0.1 mg/m3	0.00	0.0077
11/28/2022 8:21	5 ppm	0.0	0.1 mg/m3	0.00	0.002
11/28/2022 8:22	5 ppm	0.0	0.1 mg/m3	0.00	0.0016
11/28/2022 8:23	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:24	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:25	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:26	5 ppm	0.0	0.1 mg/m3	0.00	0.0002
11/28/2022 8:27	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:28	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:29	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:30	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:31	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:32	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:33	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:34	5 ppm	0.0	0.1 mg/m3	0.00	0.0002
11/28/2022 8:35	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:36	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:37	5 ppm	0.0	0.1 mg/m3	0.00	0.0004
11/28/2022 8:38	5 ppm	0.0	0.1 mg/m3	0.00	0.0005
11/28/2022 8:39	5 ppm	0.0	0.1 mg/m3	0.00	0.0005
11/28/2022 8:40	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:41	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:42	5 ppm	0.0	0.1 mg/m3	0.00	0.0007
11/28/2022 8:43	5 ppm	0.0	0.1 mg/m3	0.00	0.0007
11/28/2022 8:44	5 ppm	0.0	0.1 mg/m3	0.00	0.0008
11/28/2022 8:45	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:46	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:47	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:48	5 ppm	0.0	0.1 mg/m3	0.00	0.001
11/28/2022 8:49	5 ppm	0.0	0.1 mg/m3	0.00	0.0011
11/28/2022 8:50	5 ppm	0.0	0.1 mg/m3	0.00	0.0011
11/28/2022 8:51	5 ppm	0.0	0.1 mg/m3	0.00	0.0012
11/28/2022 8:52	5 ppm	0.0	0.1 mg/m3	0.00	0.0013
11/28/2022 8:53	5 ppm	0.0	0.1 mg/m3	0.00	0.0013
11/28/2022 8:54	5 ppm	0.0	0.1 mg/m3	0.00	0.0014
11/28/2022 8:55	5 ppm	0.0	0.1 mg/m3	0.00	0.0015
11/28/2022 8:56	5 ppm	0.0	0.1 mg/m3	0.01	0.0015
11/28/2022 8:57	5 ppm	0.0	0.1 mg/m3	0.01	0.0016
11/28/2022 8:58	5 ppm	0.0	0.1 mg/m3	0.01	0.0017
11/28/2022 8:59	5 ppm	0.0	0.1 mg/m3	0.01	0.0018
11/28/2022 9:00	5 ppm	0.0	0.1 mg/m3	0.02	0.002
11/28/2022 9:01	5 ppm	0.0	0.1 mg/m3	0.02	0.0021
11/28/2022 9:02	5 ppm	0.0	0.1 mg/m3	0.02	0.0023
11/28/2022 9:03	5 ppm	0.0	0.1 mg/m3	0.03	0.0024
11/28/2022 9:04	5 ppm	0.0	0.1 mg/m3	0.03	0.0025
11/28/2022 9:05	5 ppm	0.0	0.1 mg/m3	0.03	0.0026
11/28/2022 9:06	5 ppm	0.0	0.1 mg/m3	0.04	0.0027
11/28/2022 9:07	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 9:08	5 ppm	0.0	0.1 mg/m3	0.04	0.0029
11/28/2022 9:09	5 ppm	0.0	0.1 mg/m3	0.04	0.0031
11/28/2022 9:10	5 ppm	0.0	0.1 mg/m3	0.05	0.0031
11/28/2022 9:11	5 ppm	0.0	0.1 mg/m3	0.05	0.0032
11/28/2022 9:12	5 ppm	0.0	0.1 mg/m3	0.05	0.0033
11/28/2022 9:13	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:14	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:15	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:16	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:17	5 ppm	0.0	0.1 mg/m3	0.07	0.0035
11/28/2022 9:18	5 ppm	0.0	0.1 mg/m3	0.07	0.0036
11/28/2022 9:19	5 ppm	0.0	0.1 mg/m3	0.07	0.0036
11/28/2022 9:20	5 ppm	0.0	0.1 mg/m3	0.08	0.0036
11/28/2022 9:21	5 ppm	0.0	0.1 mg/m3	0.08	0.0036
11/28/2022 9:22	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:23	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:24	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:25	5 ppm	0.0	0.1 mg/m3	0.09	0.0037
11/28/2022 9:26	5 ppm	0.0	0.1 mg/m3	0.09	0.0038
11/28/2022 9:27	5 ppm	0.0	0.1 mg/m3	0.09	0.0039
11/28/2022 9:28	5 ppm	0.0	0.1 mg/m3	0.09	0.0039
11/28/2022 9:29	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:30	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:31	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:32	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:33	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:34	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:35	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:36	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:37	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:38	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:39	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:40	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:41	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:42	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:43	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:44	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:45	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:46	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:47	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:48	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:49	5 ppm	0.0	0.1 mg/m3	0.12	0.004
11/28/2022 9:50	5 ppm	0.0	0.1 mg/m3	0.12	0.0041
11/28/2022 9:51	5 ppm	0.0	0.1 mg/m3	0.12	0.0041
11/28/2022 9:52	5 ppm	0.0	0.1 mg/m3	0.12	0.0042
11/28/2022 9:53	5 ppm	0.0	0.1 mg/m3	0.12	0.0043
11/28/2022 9:54	5 ppm	0.0	0.1 mg/m3	0.12	0.0043
11/28/2022 9:55	5 ppm	0.0	0.1 mg/m3	0.12	0.0044
11/28/2022 9:56	5 ppm	0.0	0.1 mg/m3	0.12	0.0045
11/28/2022 9:57	5 ppm	0.0	0.1 mg/m3	0.12	0.0045
11/28/2022 9:58	5 ppm	0.0	0.1 mg/m3	0.12	0.0046
11/28/2022 9:59	5 ppm	0.0	0.1 mg/m3	0.12	0.0047
11/28/2022 10:00	5 ppm	0.0	0.1 mg/m3	0.12	0.0047
11/28/2022 10:01	5 ppm	0.0	0.1 mg/m3	0.12	0.0048
11/28/2022 10:02	5 ppm	0.0	0.1 mg/m3	0.12	0.0049
11/28/2022 10:03	5 ppm	0.0	0.1 mg/m3	0.12	0.0049
11/28/2022 10:04	5 ppm	0.0	0.1 mg/m3	0.12	0.0051
11/28/2022 10:05	5 ppm	0.0	0.1 mg/m3	0.13	0.0051
11/28/2022 10:06	5 ppm	---	0.1 mg/m3	0.13	---
11/28/2022 10:07	5 ppm	0.0	0.1 mg/m3	0.13	0.0052
11/28/2022 10:08	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 10:09	5 ppm	---	0.1 mg/m3	0.13	---
11/28/2022 10:10	5 ppm	0.0	0.1 mg/m3	0.13	0.0053
11/28/2022 10:11	5 ppm	0.0	0.1 mg/m3	0.13	0.0054
11/28/2022 10:12	5 ppm	0.0	0.1 mg/m3	0.13	0.0055
11/28/2022 10:13	5 ppm	0.0	0.1 mg/m3	0.13	0.0056
11/28/2022 10:14	5 ppm	0.0	0.1 mg/m3	0.13	0.0057
11/28/2022 10:15	5 ppm	0.0	0.1 mg/m3	0.14	0.0057
11/28/2022 10:16	5 ppm	0.0	0.1 mg/m3	0.14	0.0058
11/28/2022 10:17	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:18	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:19	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:20	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:21	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:22	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:23	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:24	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:25	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:26	5 ppm	---	0.1 mg/m3	0.14	---
11/28/2022 10:27	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:28	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:29	5 ppm	0.0	0.1 mg/m3	0.14	0.0058
11/28/2022 10:30	5 ppm	0.0	0.1 mg/m3	0.15	0.0057
11/28/2022 10:31	5 ppm	0.0	0.1 mg/m3	0.15	0.0056
11/28/2022 10:32	5 ppm	0.0	0.1 mg/m3	0.15	0.0056
11/28/2022 10:33	5 ppm	0.0	0.1 mg/m3	0.15	0.0055
11/28/2022 10:34	5 ppm	0.0	0.1 mg/m3	0.15	0.0054
11/28/2022 10:35	5 ppm	0.0	0.1 mg/m3	0.15	0.0054
11/28/2022 10:36	5 ppm	0.0	0.1 mg/m3	0.15	0.0053
11/28/2022 10:37	5 ppm	0.0	0.1 mg/m3	0.15	0.0052
11/28/2022 10:38	5 ppm	0.0	0.1 mg/m3	0.15	0.0051
11/28/2022 10:39	5 ppm	0.0	0.1 mg/m3	0.15	0.0051
11/28/2022 10:40	5 ppm	0.0	0.1 mg/m3	0.15	0.005
11/28/2022 10:41	5 ppm	0.0	0.1 mg/m3	0.15	0.005
11/28/2022 10:42	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:43	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:44	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:45	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:46	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:47	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:48	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:49	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:50	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:51	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:52	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:53	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:54	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:55	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:56	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:57	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:58	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:59	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:00	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:01	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:02	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:03	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:04	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:05	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:06	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:07	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:08	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:09	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:10	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 11:11	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:12	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:13	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:14	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:15	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:16	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:17	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:18	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:19	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:20	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:21	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:22	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:23	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:24	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:25	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:26	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:27	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:28	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:29	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:30	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:31	5 ppm	0.0	0.1 mg/m3	0.17	0.0051
11/28/2022 11:32	5 ppm	0.0	0.1 mg/m3	0.17	0.0051
11/28/2022 11:33	5 ppm	0.0	0.1 mg/m3	0.17	0.0052
11/28/2022 11:34	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:35	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:36	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:37	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:38	5 ppm	0.0	0.1 mg/m3	0.17	0.0054
11/28/2022 11:39	5 ppm	0.0	0.1 mg/m3	0.17	0.0055
11/28/2022 11:40	5 ppm	0.0	0.1 mg/m3	0.17	0.0055
11/28/2022 11:41	5 ppm	0.0	0.1 mg/m3	0.17	0.0056
11/28/2022 11:42	5 ppm	0.0	0.1 mg/m3	0.17	0.0057
11/28/2022 11:43	5 ppm	0.0	0.1 mg/m3	0.17	0.0057
11/28/2022 11:44	5 ppm	0.0	0.1 mg/m3	0.17	0.0059
11/28/2022 11:45	5 ppm	0.0	0.1 mg/m3	0.17	0.006
11/28/2022 11:46	5 ppm	0.0	0.1 mg/m3	0.17	0.0061
11/28/2022 11:47	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 11:48	5 ppm	0.0	0.1 mg/m3	0.18	0.0062
11/28/2022 11:49	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 11:50	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 11:51	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 11:52	5 ppm	0.0	0.1 mg/m3	0.18	0.0066
11/28/2022 11:53	5 ppm	---	0.1 mg/m3	0.18	---
11/28/2022 11:54	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 11:55	5 ppm	0.0	0.1 mg/m3	0.18	0.0068
11/28/2022 11:56	5 ppm	0.0	0.1 mg/m3	0.18	0.0069
11/28/2022 11:57	5 ppm	0.0	0.1 mg/m3	0.18	0.007
11/28/2022 11:58	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 11:59	5 ppm	0.0	0.1 mg/m3	0.18	0.0072
11/28/2022 12:00	5 ppm	0.0	0.1 mg/m3	0.18	0.0073
11/28/2022 12:01	5 ppm	0.0	0.1 mg/m3	0.18	0.0074
11/28/2022 12:02	5 ppm	0.0	0.1 mg/m3	0.18	0.0074
11/28/2022 12:03	5 ppm	0.0	0.1 mg/m3	0.18	0.0075
11/28/2022 12:04	5 ppm	0.0	0.1 mg/m3	0.18	0.0075
11/28/2022 12:05	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:06	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:07	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:08	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:09	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:10	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:11	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:11	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 12:12	5 ppm	---	0.1 mg/m3	0.18	---
11/28/2022 12:13	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:14	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:15	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:16	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:17	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:18	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:19	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:20	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:21	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:22	5 ppm	0.0	0.1 mg/m3	0.17	0.0076
11/28/2022 12:23	5 ppm	0.0	0.1 mg/m3	0.17	0.0075
11/28/2022 12:24	5 ppm	0.0	0.1 mg/m3	0.17	0.0074
11/28/2022 12:25	5 ppm	0.0	0.1 mg/m3	0.17	0.0074
11/28/2022 12:26	5 ppm	0.0	0.1 mg/m3	0.17	0.0073
11/28/2022 12:27	5 ppm	0.0	0.1 mg/m3	0.17	0.0073
11/28/2022 12:28	5 ppm	0.0	0.1 mg/m3	0.18	0.0073
11/28/2022 12:29	5 ppm	0.0	0.1 mg/m3	0.18	0.0072
11/28/2022 12:30	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 12:31	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 12:32	5 ppm	0.0	0.1 mg/m3	0.18	0.007
11/28/2022 12:33	5 ppm	0.0	0.1 mg/m3	0.18	0.0069
11/28/2022 12:34	5 ppm	0.0	0.1 mg/m3	0.18	0.0068
11/28/2022 12:35	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 12:36	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 12:37	5 ppm	0.0	0.1 mg/m3	0.18	0.0066
11/28/2022 12:38	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 12:39	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 12:40	5 ppm	0.0	0.1 mg/m3	0.18	0.0064
11/28/2022 12:41	5 ppm	0.0	0.1 mg/m3	0.18	0.0064
11/28/2022 12:42	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 12:43	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 12:44	5 ppm	0.0	0.1 mg/m3	0.18	0.0062
11/28/2022 12:45	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:46	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:47	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:48	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:49	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:50	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:51	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:52	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:53	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:54	5 ppm	0.0	0.1 mg/m3	0.18	0.006
11/28/2022 12:55	5 ppm	0.0	0.1 mg/m3	0.18	0.0059
11/28/2022 12:56	5 ppm	0.0	0.1 mg/m3		0.0058
11/28/2022 12:57	5 ppm	0.0	0.1 mg/m3	0.18	0.0057
11/28/2022 12:58	5 ppm	0.0	0.1 mg/m3	0.18	0.0057
11/28/2022 12:59	5 ppm	0.0	0.1 mg/m3	0.18	0.0056
11/28/2022 13:00	5 ppm	0.0	0.1 mg/m3	0.18	0.0055
11/28/2022 13:01	5 ppm	0.0	0.1 mg/m3	0.18	0.0055
11/28/2022 13:02	5 ppm	0.0	0.1 mg/m3	0.18	0.0054
11/28/2022 13:03	5 ppm	0.0	0.1 mg/m3	0.18	0.0053
11/28/2022 13:04	5 ppm	0.0	0.1 mg/m3	0.18	0.0053
11/28/2022 13:05	5 ppm	0.0	0.1 mg/m3	0.18	0.0052
11/28/2022 13:06

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 5: Station 1 Dust Monitor - November 28, 2022 Data

Timestamp (America/New_York)	Guidance Value	Mass Conc. Total (mg/m³)	Guidance Value	VOC ppm AVG 15m (ppm)	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/28/2022 8:05	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 8:06	5 ppm	0.1	0.1 mg/m3	0.00	0.085
11/28/2022 8:07	5 ppm	0.0	0.1 mg/m3	0.00	0.0455
11/28/2022 8:08	5 ppm	0.0	0.1 mg/m3	0.00	0.0353
11/28/2022 8:09	5 ppm	0.0	0.1 mg/m3	0.00	0.0275
11/28/2022 8:10	5 ppm	0.0	0.1 mg/m3	0.00	0.0222
11/28/2022 8:11	5 ppm	0.0	0.1 mg/m3	0.00	0.0188
11/28/2022 8:12	5 ppm	0.0	0.1 mg/m3	0.00	0.0163
11/28/2022 8:13	5 ppm	0.0	0.1 mg/m3	0.00	0.0143
11/28/2022 8:14	5 ppm	0.0	0.1 mg/m3	0.00	0.0128
11/28/2022 8:15	5 ppm	0.0	0.1 mg/m3	0.00	0.0115
11/28/2022 8:16	5 ppm	0.0	0.1 mg/m3	---	0.0105
11/28/2022 8:17	5 ppm	0.0	0.1 mg/m3	0.00	0.0096
11/28/2022 8:18	5 ppm	0.0	0.1 mg/m3	0.00	0.0088
11/28/2022 8:19	5 ppm	0.0	0.1 mg/m3	0.00	0.0082
11/28/2022 8:20	5 ppm	0.0	0.1 mg/m3	0.00	0.0077
11/28/2022 8:21	5 ppm	0.0	0.1 mg/m3	0.00	0.002
11/28/2022 8:22	5 ppm	0.0	0.1 mg/m3	0.00	0.0016
11/28/2022 8:23	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:24	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:25	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:26	5 ppm	0.0	0.1 mg/m3	0.00	0.0002
11/28/2022 8:27	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:28	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:29	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:30	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:31	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:32	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:33	5 ppm	0.0	0.1 mg/m3	0.00	0.0001
11/28/2022 8:34	5 ppm	0.0	0.1 mg/m3	0.00	0.0002
11/28/2022 8:35	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:36	5 ppm	0.0	0.1 mg/m3	0.00	0.0003
11/28/2022 8:37	5 ppm	0.0	0.1 mg/m3	0.00	0.0004
11/28/2022 8:38	5 ppm	0.0	0.1 mg/m3	0.00	0.0005
11/28/2022 8:39	5 ppm	0.0	0.1 mg/m3	0.00	0.0005
11/28/2022 8:40	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:41	5 ppm	0.0	0.1 mg/m3	0.00	0.0006
11/28/2022 8:42	5 ppm	0.0	0.1 mg/m3	0.00	0.0007
11/28/2022 8:43	5 ppm	0.0	0.1 mg/m3	0.00	0.0007
11/28/2022 8:44	5 ppm	0.0	0.1 mg/m3	0.00	0.0008
11/28/2022 8:45	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:46	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:47	5 ppm	0.0	0.1 mg/m3	0.00	0.0009
11/28/2022 8:48	5 ppm	0.0	0.1 mg/m3	0.00	0.001
11/28/2022 8:49	5 ppm	0.0	0.1 mg/m3	0.00	0.0011
11/28/2022 8:50	5 ppm	0.0	0.1 mg/m3	0.00	0.0011
11/28/2022 8:51	5 ppm	0.0	0.1 mg/m3	0.00	0.0012
11/28/2022 8:52	5 ppm	0.0	0.1 mg/m3	0.00	0.0013
11/28/2022 8:53	5 ppm	0.0	0.1 mg/m3	0.00	0.0013
11/28/2022 8:54	5 ppm	0.0	0.1 mg/m3	0.00	0.0014
11/28/2022 8:55	5 ppm	0.0	0.1 mg/m3	0.00	0.0015
11/28/2022 8:56	5 ppm	0.0	0.1 mg/m3	0.01	0.0015
11/28/2022 8:57	5 ppm	0.0	0.1 mg/m3	0.01	0.0016
11/28/2022 8:58	5 ppm	0.0	0.1 mg/m3	0.01	0.0017
11/28/2022 8:59	5 ppm	0.0	0.1 mg/m3	0.01	0.0018
11/28/2022 9:00	5 ppm	0.0	0.1 mg/m3	0.02	0.002
11/28/2022 9:01	5 ppm	0.0	0.1 mg/m3	0.02	0.0021
11/28/2022 9:02	5 ppm	0.0	0.1 mg/m3	0.02	0.0023
11/28/2022 9:03	5 ppm	0.0	0.1 mg/m3	0.03	0.0024
11/28/2022 9:04	5 ppm	0.0	0.1 mg/m3	0.03	0.0025
11/28/2022 9:05	5 ppm	0.0	0.1 mg/m3	0.03	0.0026
11/28/2022 9:06	5 ppm	0.0	0.1 mg/m3	0.04	0.0027
11/28/2022 9:07	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 9:08	5 ppm	0.0	0.1 mg/m3	0.04	0.0029
11/28/2022 9:09	5 ppm	0.0	0.1 mg/m3	0.04	0.0031
11/28/2022 9:10	5 ppm	0.0	0.1 mg/m3	0.05	0.0031
11/28/2022 9:11	5 ppm	0.0	0.1 mg/m3	0.05	0.0032
11/28/2022 9:12	5 ppm	0.0	0.1 mg/m3	0.05	0.0033
11/28/2022 9:13	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:14	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:15	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:16	5 ppm	0.0	0.1 mg/m3	0.06	0.0034
11/28/2022 9:17	5 ppm	0.0	0.1 mg/m3	0.07	0.0035
11/28/2022 9:18	5 ppm	0.0	0.1 mg/m3	0.07	0.0036
11/28/2022 9:19	5 ppm	0.0	0.1 mg/m3	0.07	0.0036
11/28/2022 9:20	5 ppm	0.0	0.1 mg/m3	0.08	0.0036
11/28/2022 9:21	5 ppm	0.0	0.1 mg/m3	0.08	0.0036
11/28/2022 9:22	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:23	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:24	5 ppm	0.0	0.1 mg/m3	0.08	0.0037
11/28/2022 9:25	5 ppm	0.0	0.1 mg/m3	0.09	0.0037
11/28/2022 9:26	5 ppm	0.0	0.1 mg/m3	0.09	0.0038
11/28/2022 9:27	5 ppm	0.0	0.1 mg/m3	0.09	0.0039
11/28/2022 9:28	5 ppm	0.0	0.1 mg/m3	0.09	0.0039
11/28/2022 9:29	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:30	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:31	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:32	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:33	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:34	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:35	5 ppm	0.0	0.1 mg/m3	0.10	0.004
11/28/2022 9:36	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:37	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:38	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:39	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:40	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:41	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:42	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:43	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:44	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:45	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:46	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:47	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:48	5 ppm	0.0	0.1 mg/m3	0.11	0.004
11/28/2022 9:49	5 ppm	0.0	0.1 mg/m3	0.12	0.004
11/28/2022 9:50	5 ppm	0.0	0.1 mg/m3	0.12	0.0041
11/28/2022 9:51	5 ppm	0.0	0.1 mg/m3	0.12	0.0041
11/28/2022 9:52	5 ppm	0.0	0.1 mg/m3	0.12	0.0042
11/28/2022 9:53	5 ppm	0.0	0.1 mg/m3	0.12	0.0043
11/28/2022 9:54	5 ppm	0.0	0.1 mg/m3	0.12	0.0043
11/28/2022 9:55	5 ppm	0.0	0.1 mg/m3	0.12	0.0044
11/28/2022 9:56	5 ppm	0.0	0.1 mg/m3	0.12	0.0045
11/28/2022 9:57	5 ppm	0.0	0.1 mg/m3	0.12	0.0045
11/28/2022 9:58	5 ppm	0.0	0.1 mg/m3	0.12	0.0046
11/28/2022 9:59	5 ppm	0.0	0.1 mg/m3	0.12	0.0047
11/28/2022 10:00	5 ppm	0.0	0.1 mg/m3	0.12	0.0047
11/28/2022 10:01	5 ppm	0.0	0.1 mg/m3	0.12	0.0048
11/28/2022 10:02	5 ppm	0.0	0.1 mg/m3	0.12	0.0049
11/28/2022 10:03	5 ppm	0.0	0.1 mg/m3	0.12	0.0049
11/28/2022 10:04	5 ppm	0.0	0.1 mg/m3	0.12	0.0051
11/28/2022 10:05	5 ppm	0.0	0.1 mg/m3	0.13	0.0051
11/28/2022 10:06	5 ppm	---	0.1 mg/m3	0.13	---
11/28/2022 10:07	5 ppm	0.0	0.1 mg/m3	0.13	0.0052
11/28/2022 10:08	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 10:09	5 ppm	---	0.1 mg/m3	0.13	---
11/28/2022 10:10	5 ppm	0.0	0.1 mg/m3	0.13	0.0053
11/28/2022 10:11	5 ppm	0.0	0.1 mg/m3	0.13	0.0054
11/28/2022 10:12	5 ppm	0.0	0.1 mg/m3	0.13	0.0055
11/28/2022 10:13	5 ppm	0.0	0.1 mg/m3	0.13	0.0056
11/28/2022 10:14	5 ppm	0.0	0.1 mg/m3	0.13	0.0057
11/28/2022 10:15	5 ppm	0.0	0.1 mg/m3	0.14	0.0057
11/28/2022 10:16	5 ppm	0.0	0.1 mg/m3	0.14	0.0058
11/28/2022 10:17	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:18	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:19	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:20	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:21	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:22	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:23	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:24	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:25	5 ppm	0.0	0.1 mg/m3	0.14	0.006
11/28/2022 10:26	5 ppm	---	0.1 mg/m3	0.14	---
11/28/2022 10:27	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:28	5 ppm	0.0	0.1 mg/m3	0.14	0.0059
11/28/2022 10:29	5 ppm	0.0	0.1 mg/m3	0.14	0.0058
11/28/2022 10:30	5 ppm	0.0	0.1 mg/m3	0.15	0.0057
11/28/2022 10:31	5 ppm	0.0	0.1 mg/m3	0.15	0.0056
11/28/2022 10:32	5 ppm	0.0	0.1 mg/m3	0.15	0.0056
11/28/2022 10:33	5 ppm	0.0	0.1 mg/m3	0.15	0.0055
11/28/2022 10:34	5 ppm	0.0	0.1 mg/m3	0.15	0.0054
11/28/2022 10:35	5 ppm	0.0	0.1 mg/m3	0.15	0.0054
11/28/2022 10:36	5 ppm	0.0	0.1 mg/m3	0.15	0.0053
11/28/2022 10:37	5 ppm	0.0	0.1 mg/m3	0.15	0.0052
11/28/2022 10:38	5 ppm	0.0	0.1 mg/m3	0.15	0.0051
11/28/2022 10:39	5 ppm	0.0	0.1 mg/m3	0.15	0.0051
11/28/2022 10:40	5 ppm	0.0	0.1 mg/m3	0.15	0.005
11/28/2022 10:41	5 ppm	0.0	0.1 mg/m3	0.15	0.005
11/28/2022 10:42	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:43	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:44	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:45	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:46	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:47	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:48	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:49	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:50	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:51	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:52	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:53	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:54	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:55	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:56	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:57	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:58	5 ppm	0.0	0.1 mg/m3	0.16	0.005
11/28/2022 10:59	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:00	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:01	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:02	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:03	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:04	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:05	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:06	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:07	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:08	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:09	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:10	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 11:11	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:12	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:13	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:14	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:15	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:16	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:17	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:18	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:19	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:20	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:21	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:22	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:23	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:24	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:25	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:26	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:27	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:28	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:29	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:30	5 ppm	0.0	0.1 mg/m3	0.17	0.005
11/28/2022 11:31	5 ppm	0.0	0.1 mg/m3	0.17	0.0051
11/28/2022 11:32	5 ppm	0.0	0.1 mg/m3	0.17	0.0051
11/28/2022 11:33	5 ppm	0.0	0.1 mg/m3	0.17	0.0052
11/28/2022 11:34	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:35	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:36	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:37	5 ppm	0.0	0.1 mg/m3	0.17	0.0053
11/28/2022 11:38	5 ppm	0.0	0.1 mg/m3	0.17	0.0054
11/28/2022 11:39	5 ppm	0.0	0.1 mg/m3	0.17	0.0055
11/28/2022 11:40	5 ppm	0.0	0.1 mg/m3	0.17	0.0055
11/28/2022 11:41	5 ppm	0.0	0.1 mg/m3	0.17	0.0056
11/28/2022 11:42	5 ppm	0.0	0.1 mg/m3	0.17	0.0057
11/28/2022 11:43	5 ppm	0.0	0.1 mg/m3	0.17	0.0057
11/28/2022 11:44	5 ppm	0.0	0.1 mg/m3	0.17	0.0059
11/28/2022 11:45	5 ppm	0.0	0.1 mg/m3	0.17	0.006
11/28/2022 11:46	5 ppm	0.0	0.1 mg/m3	0.17	0.0061
11/28/2022 11:47	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 11:48	5 ppm	0.0	0.1 mg/m3	0.18	0.0062
11/28/2022 11:49	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 11:50	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 11:51	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 11:52	5 ppm	0.0	0.1 mg/m3	0.18	0.0066
11/28/2022 11:53	5 ppm	---	0.1 mg/m3	0.18	---
11/28/2022 11:54	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 11:55	5 ppm	0.0	0.1 mg/m3	0.18	0.0068
11/28/2022 11:56	5 ppm	0.0	0.1 mg/m3	0.18	0.0069
11/28/2022 11:57	5 ppm	0.0	0.1 mg/m3	0.18	0.007
11/28/2022 11:58	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 11:59	5 ppm	0.0	0.1 mg/m3	0.18	0.0072
11/28/2022 12:00	5 ppm	0.0	0.1 mg/m3	0.18	0.0073
11/28/2022 12:01	5 ppm	0.0	0.1 mg/m3	0.18	0.0074
11/28/2022 12:02	5 ppm	0.0	0.1 mg/m3	0.18	0.0074
11/28/2022 12:03	5 ppm	0.0	0.1 mg/m3	0.18	0.0075
11/28/2022 12:04	5 ppm	0.0	0.1 mg/m3	0.18	0.0075
11/28/2022 12:05	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:06	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:07	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:08	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:09	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:10	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:11	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:11	5 ppm	---	0.1 mg/m3	---	---
11/28/2022 12:12	5 ppm	---	0.1 mg/m3	0.18	---
11/28/2022 12:13	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:14	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:15	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:16	5 ppm	0.0	0.1 mg/m3	0.18	0.0079
11/28/2022 12:17	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:18	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:19	5 ppm	0.0	0.1 mg/m3	0.18	0.0078
11/28/2022 12:20	5 ppm	0.0	0.1 mg/m3	0.18	0.0077
11/28/2022 12:21	5 ppm	0.0	0.1 mg/m3	0.18	0.0076
11/28/2022 12:22	5 ppm	0.0	0.1 mg/m3	0.17	0.0076
11/28/2022 12:23	5 ppm	0.0	0.1 mg/m3	0.17	0.0075
11/28/2022 12:24	5 ppm	0.0	0.1 mg/m3	0.17	0.0074
11/28/2022 12:25	5 ppm	0.0	0.1 mg/m3	0.17	0.0074
11/28/2022 12:26	5 ppm	0.0	0.1 mg/m3	0.17	0.0073
11/28/2022 12:27	5 ppm	0.0	0.1 mg/m3	0.17	0.0073
11/28/2022 12:28	5 ppm	0.0	0.1 mg/m3	0.18	0.0073
11/28/2022 12:29	5 ppm	0.0	0.1 mg/m3	0.18	0.0072
11/28/2022 12:30	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 12:31	5 ppm	0.0	0.1 mg/m3	0.18	0.0071
11/28/2022 12:32	5 ppm	0.0	0.1 mg/m3	0.18	0.007
11/28/2022 12:33	5 ppm	0.0	0.1 mg/m3	0.18	0.0069
11/28/2022 12:34	5 ppm	0.0	0.1 mg/m3	0.18	0.0068
11/28/2022 12:35	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 12:36	5 ppm	0.0	0.1 mg/m3	0.18	0.0067
11/28/2022 12:37	5 ppm	0.0	0.1 mg/m3	0.18	0.0066
11/28/2022 12:38	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 12:39	5 ppm	0.0	0.1 mg/m3	0.18	0.0065
11/28/2022 12:40	5 ppm	0.0	0.1 mg/m3	0.18	0.0064
11/28/2022 12:41	5 ppm	0.0	0.1 mg/m3	0.18	0.0064
11/28/2022 12:42	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 12:43	5 ppm	0.0	0.1 mg/m3	0.18	0.0063
11/28/2022 12:44	5 ppm	0.0	0.1 mg/m3	0.18	0.0062
11/28/2022 12:45	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:46	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:47	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:48	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:49	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:50	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:51	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:52	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:53	5 ppm	0.0	0.1 mg/m3	0.18	0.0061
11/28/2022 12:54	5 ppm	0.0	0.1 mg/m3	0.18	0.006
11/28/2022 12:55	5 ppm	0.0	0.1 mg/m3	0.18	0.0059
11/28/2022 12:56	5 ppm	0.0	0.1 mg/m3	0.18	0.0058
11/28/2022 12:57	5 ppm	0.0	0.1 mg/m3	0.18	0.0057
11/28/2022 12:58	5 ppm	0.0	0.1 mg/m3	0.18	0.0057
11/28/2022 12:59	5 ppm	0.0	0.1 mg/m3	0.18	0.0056
11/28/2022 13:00	5 ppm	0.0	0.1 mg/m3	0.18	0.0055
11/28/2022 13:01	5 ppm	0.0	0.1 mg/m3	0.18	0.0055
11/28/2022 13:02	5 ppm	0.0	0.1 mg/m3	0.18	0.0054
11/28/2022 13:03	5 ppm	0.0	0.1 mg/m3	0.18	0.0053
11/28/2022 13:04	5 ppm	0.0	0.1 mg/m3	0.18	0.0053
11/28/2022 13:05	5 ppm	0.0	0.1 mg/m3	0.18	0.0052
11/28/2

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 6: Station 1 Dust Monitor - December 2, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
12/2/2022 8:07	5 ppm	---	0.1 mg/m3	---
12/2/2022 8:09	5 ppm	0	0.1 mg/m3	0.011
12/2/2022 8:10	5 ppm	0	0.1 mg/m3	0.01
12/2/2022 8:11	5 ppm	0	0.1 mg/m3	0.0097
12/2/2022 8:12	5 ppm	---	0.1 mg/m3	0.0095
12/2/2022 8:13	5 ppm	0	0.1 mg/m3	0.0092
12/2/2022 8:14	5 ppm	0	0.1 mg/m3	0.009
12/2/2022 8:15	5 ppm	0	0.1 mg/m3	0.0089
12/2/2022 8:16	5 ppm	0	0.1 mg/m3	0.009
12/2/2022 8:17	5 ppm	0	0.1 mg/m3	0.009
12/2/2022 8:18	5 ppm	0.0239	0.1 mg/m3	0.0091
12/2/2022 8:19	5 ppm	0.029	0.1 mg/m3	0.0092
12/2/2022 8:20	5 ppm	0.0312	0.1 mg/m3	0.0092
12/2/2022 8:21	5 ppm	0.034	0.1 mg/m3	0.0092
12/2/2022 8:22	5 ppm	0.0408	0.1 mg/m3	0.0092
12/2/2022 8:23	5 ppm	0.0379	0.1 mg/m3	0.0093
12/2/2022 8:24	5 ppm	0.0379	0.1 mg/m3	0.0093
12/2/2022 8:25	5 ppm	0.0379	0.1 mg/m3	0.0094
12/2/2022 8:26	5 ppm	0.0379	0.1 mg/m3	0.0095
12/2/2022 8:27	5 ppm	0.0354	0.1 mg/m3	0.0095
12/2/2022 8:28	5 ppm	0.0354	0.1 mg/m3	0.0096
12/2/2022 8:29	5 ppm	0.0354	0.1 mg/m3	0.0097
12/2/2022 8:30	5 ppm	0.0354	0.1 mg/m3	0.0099
12/2/2022 8:31	5 ppm	0.0354	0.1 mg/m3	0.0099
12/2/2022 8:32	5 ppm	0.0357	0.1 mg/m3	0.0101
12/2/2022 8:33	5 ppm	0.0221	0.1 mg/m3	0.0102
12/2/2022 8:34	5 ppm	0.0175	0.1 mg/m3	0.0102
12/2/2022 8:35	5 ppm	0.0143	0.1 mg/m3	0.0103
12/2/2022 8:36	5 ppm	0.0105	0.1 mg/m3	0.0103
12/2/2022 8:37	5 ppm	0.0031	0.1 mg/m3	0.0102
12/2/2022 8:38	5 ppm	0.0043	0.1 mg/m3	0.0101
12/2/2022 8:39	5 ppm	0.0055	0.1 mg/m3	0.01
12/2/2022 8:40	5 ppm	0.0073	0.1 mg/m3	0.0099
12/2/2022 8:41	5 ppm	0.0093	0.1 mg/m3	0.0097
12/2/2022 8:42	5 ppm	0.0115	0.1 mg/m3	0.0097
12/2/2022 8:43	5 ppm	0.0141	0.1 mg/m3	0.0097
12/2/2022 8:44	5 ppm	0.0172	0.1 mg/m3	0.0097
12/2/2022 8:45	5 ppm	0.0204	0.1 mg/m3	0.0095
12/2/2022 8:46	5 ppm	0.0236	0.1 mg/m3	0.0095
12/2/2022 8:47	5 ppm	0.0269	0.1 mg/m3	0.0093
12/2/2022 8:48	5 ppm	0.0296	0.1 mg/m3	0.0092
12/2/2022 8:49	5 ppm	0.0325	0.1 mg/m3	0.0093
12/2/2022 8:50	5 ppm	0.0361	0.1 mg/m3	0.0093
12/2/2022 8:51	5 ppm	0.0397	0.1 mg/m3	0.0093
12/2/2022 8:52	5 ppm	0.0431	0.1 mg/m3	0.0093
12/2/2022 8:53	5 ppm	0.0463	0.1 mg/m3	0.0093
12/2/2022 8:54	5 ppm	0.0495	0.1 mg/m3	0.0093
12/2/2022 8:55	5 ppm	0.0527	0.1 mg/m3	0.0094
12/2/2022 8:56	5 ppm	0.0553	0.1 mg/m3	0.0094
12/2/2022 8:57	5 ppm	0.0579	0.1 mg/m3	0.0094
12/2/2022 8:58	5 ppm	0.0602	0.1 mg/m3	0.0094
12/2/2022 8:59	5 ppm	0.0624	0.1 mg/m3	0.0093
12/2/2022 9:00	5 ppm	0.0646	0.1 mg/m3	0.0093
12/2/2022 9:01	5 ppm	0.0671	0.1 mg/m3	0.0093
12/2/2022 9:02	5 ppm	0.0693	0.1 mg/m3	0.0092
12/2/2022 9:03	5 ppm	0.0719	0.1 mg/m3	0.0091
12/2/2022 9:04	5 ppm	0.0745	0.1 mg/m3	0.0088
12/2/2022 9:05	5 ppm	0.0769	0.1 mg/m3	0.0087
12/2/2022 9:06	5 ppm	0.0791	0.1 mg/m3	0.0086
12/2/2022 9:07	5 ppm	0.0815	0.1 mg/m3	0.0085
12/2/2022 9:08	5 ppm	0.084	0.1 mg/m3	0.0084
12/2/2022 9:09	5 ppm	---	0.1 mg/m3	---
12/2/2022 9:10	5 ppm	0.0876	0.1 mg/m3	0.0081
12/2/2022 9:11	5 ppm	0.0904	0.1 mg/m3	0.0079
12/2/2022 9:12	5 ppm	0.0932	0.1 mg/m3	0.0078
12/2/2022 9:13	5 ppm	0.0961	0.1 mg/m3	0.0076
12/2/2022 9:14	5 ppm	0.0989	0.1 mg/m3	0.0076
12/2/2022 9:15	5 ppm	0.1016	0.1 mg/m3	0.0075
12/2/2022 9:16	5 ppm	0.1041	0.1 mg/m3	0.0074
12/2/2022 9:17	5 ppm	0.1067	0.1 mg/m3	0.0073
12/2/2022 9:18	5 ppm	0.1094	0.1 mg/m3	0.0072
12/2/2022 9:19	5 ppm	0.1121	0.1 mg/m3	0.0071
12/2/2022 9:20	5 ppm	0.1155	0.1 mg/m3	0.0069
12/2/2022 9:21	5 ppm	0.1182	0.1 mg/m3	0.0069
12/2/2022 9:22	5 ppm	0.1205	0.1 mg/m3	0.0069
12/2/2022 9:23	5 ppm	0.1223	0.1 mg/m3	0.007
12/2/2022 9:24	5 ppm	0.1229	0.1 mg/m3	0.007
12/2/2022 9:25	5 ppm	0.1246	0.1 mg/m3	0.0071
12/2/2022 9:26	5 ppm	0.1263	0.1 mg/m3	0.007
12/2/2022 9:27	5 ppm	0.1281	0.1 mg/m3	0.0069
12/2/2022 9:28	5 ppm	0.1299	0.1 mg/m3	0.0069
12/2/2022 9:29	5 ppm	0.1314	0.1 mg/m3	0.0067
12/2/2022 9:30	5 ppm	0.1332	0.1 mg/m3	0.0067
12/2/2022 9:31	5 ppm	0.1349	0.1 mg/m3	0.0066
12/2/2022 9:32	5 ppm	0.1364	0.1 mg/m3	0.0066
12/2/2022 9:33	5 ppm	0.138	0.1 mg/m3	0.0065
12/2/2022 9:34	5 ppm	0.1393	0.1 mg/m3	0.0066
12/2/2022 9:35	5 ppm	0.1398	0.1 mg/m3	0.0066
12/2/2022 9:36	5 ppm	0.1411	0.1 mg/m3	0.0065
12/2/2022 9:37	5 ppm	0.1427	0.1 mg/m3	0.0064
12/2/2022 9:38	5 ppm	0.1447	0.1 mg/m3	0.0063
12/2/2022 9:39	5 ppm	0.1464	0.1 mg/m3	0.0062
12/2/2022 9:40	5 ppm	0.1483	0.1 mg/m3	0.0061
12/2/2022 9:41	5 ppm	0.1502	0.1 mg/m3	0.0061
12/2/2022 9:42	5 ppm	0.1519	0.1 mg/m3	0.0061
12/2/2022 9:43	5 ppm	0.1535	0.1 mg/m3	0.0061
12/2/2022 9:44	5 ppm	0.1553	0.1 mg/m3	0.0061
12/2/2022 9:45	5 ppm	0.1571	0.1 mg/m3	0.0061
12/2/2022 9:46	5 ppm	0.1589	0.1 mg/m3	0.0061
12/2/2022 9:47	5 ppm	0.1606	0.1 mg/m3	0.0061
12/2/2022 9:48	5 ppm	0.1622	0.1 mg/m3	0.0062
12/2/2022 9:49	5 ppm	0.1639	0.1 mg/m3	0.0062
12/2/2022 9:50	5 ppm	0.1657	0.1 mg/m3	0.0063
12/2/2022 9:51	5 ppm	0.1671	0.1 mg/m3	0.0063
12/2/2022 9:52	5 ppm	0.1685	0.1 mg/m3	0.0063
12/2/2022 9:53	5 ppm	0.1699	0.1 mg/m3	0.0063
12/2/2022 9:54	5 ppm	0.1713	0.1 mg/m3	0.0064
12/2/2022 9:55	5 ppm	0.1726	0.1 mg/m3	0.0065
12/2/2022 9:56	5 ppm	0.1737	0.1 mg/m3	0.0065
12/2/2022 9:57	5 ppm	0.1747	0.1 mg/m3	0.0065
12/2/2022 9:58	5 ppm	0.1759	0.1 mg/m3	0.0066
12/2/2022 9:59	5 ppm	0.1768	0.1 mg/m3	0.0066
12/2/2022 10:00	5 ppm	0.1777	0.1 mg/m3	0.0066
12/2/2022 10:01	5 ppm	0.1784	0.1 mg/m3	0.0067
12/2/2022 10:02	5 ppm	0.179	0.1 mg/m3	0.0067
12/2/2022 10:03	5 ppm	0.1794	0.1 mg/m3	0.0067
12/2/2022 10:04	5 ppm	0.1799	0.1 mg/m3	0.0066
12/2/2022 10:05	5 ppm	0.1801	0.1 mg/m3	0.0065
12/2/2022 10:06	5 ppm	0.1807	0.1 mg/m3	0.0065
12/2/2022 10:07	5 ppm	0.1815	0.1 mg/m3	0.0064
12/2/2022 10:08	5 ppm	0.1818	0.1 mg/m3	0.0063
12/2/2022 10:09	5 ppm	0.1819	0.1 mg/m3	0.0061
12/2/2022 10:10	5 ppm	0.1823	0.1 mg/m3	0.006
12/2/2022 10:11	5 ppm	---	0.1 mg/m3	---
12/2/2022 10:12	5 ppm	0.1829	0.1 mg/m3	0.0059
12/2/2022 10:13	5 ppm	0.1832	0.1 mg/m3	0.0058
12/2/2022 10:14	5 ppm	0.1833	0.1 mg/m3	0.006
12/2/2022 10:15	5 ppm	0.1831	0.1 mg/m3	0.006
12/2/2022 10:16	5 ppm	0.1832	0.1 mg/m3	0.0059
12/2/2022 10:17	5 ppm	0.1834	0.1 mg/m3	0.0059
12/2/2022 10:18	5 ppm	0.1835	0.1 mg/m3	0.0059
12/2/2022 10:19	5 ppm	0.1835	0.1 mg/m3	0.0059
12/2/2022 10:20	5 ppm	0.1837	0.1 mg/m3	0.0059
12/2/2022 10:21	5 ppm	0.1836	0.1 mg/m3	0.0059
12/2/2022 10:22	5 ppm	0.1835	0.1 mg/m3	0.0059
12/2/2022 10:23	5 ppm	0.1834	0.1 mg/m3	0.006
12/2/2022 10:24	5 ppm	0.1834	0.1 mg/m3	0.0061
12/2/2022 10:25	5 ppm	0.1833	0.1 mg/m3	0.0061
12/2/2022 10:26	5 ppm	0.1833	0.1 mg/m3	0.0061
12/2/2022 10:27	5 ppm	0.1828	0.1 mg/m3	0.0061
12/2/2022 10:28	5 ppm	0.1825	0.1 mg/m3	0.0063
12/2/2022 10:29	5 ppm	0.1827	0.1 mg/m3	0.0062
12/2/2022 10:30	5 ppm	0.1827	0.1 mg/m3	0.0063
12/2/2022 10:31	5 ppm	0.1828	0.1 mg/m3	0.0064
12/2/2022 10:32	5 ppm	0.1827	0.1 mg/m3	0.0064
12/2/2022 10:33	5 ppm	0.1828	0.1 mg/m3	0.0064
12/2/2022 10:34	5 ppm	0.1829	0.1 mg/m3	0.0064
12/2/2022 10:35	5 ppm	0.183	0.1 mg/m3	0.0064
12/2/2022 10:36	5 ppm	0.1832	0.1 mg/m3	0.0064
12/2/2022 10:37	5 ppm	0.1833	0.1 mg/m3	0.0064
12/2/2022 10:38	5 ppm	0.1835	0.1 mg/m3	0.0064
12/2/2022 10:39	5 ppm	0.1837	0.1 mg/m3	0.0065
12/2/2022 10:40	5 ppm	0.184	0.1 mg/m3	0.0065
12/2/2022 10:41	5 ppm	0.1844	0.1 mg/m3	0.0066
12/2/2022 10:42	5 ppm	0.1849	0.1 mg/m3	0.0067
12/2/2022 10:43	5 ppm	0.1852	0.1 mg/m3	0.0067
12/2/2022 10:44	5 ppm	0.1854	0.1 mg/m3	0.0066
12/2/2022 10:45	5 ppm	0.1859	0.1 mg/m3	0.0065
12/2/2022 10:46	5 ppm	0.1862	0.1 mg/m3	0.0065
12/2/2022 10:47	5 ppm	0.1867	0.1 mg/m3	0.0065
12/2/2022 10:48	5 ppm	0.1871	0.1 mg/m3	0.0065
12/2/2022 10:49	5 ppm	0.1875	0.1 mg/m3	0.0065
12/2/2022 10:50	5 ppm	0.1879	0.1 mg/m3	0.0065
12/2/2022 10:51	5 ppm	0.1882	0.1 mg/m3	0.0065
12/2/2022 10:52	5 ppm	0.1887	0.1 mg/m3	0.0065
12/2/2022 10:53	5 ppm	0.1889	0.1 mg/m3	0.0065
12/2/2022 10:54	5 ppm	0.1893	0.1 mg/m3	0.0064
12/2/2022 10:55	5 ppm	0.1895	0.1 mg/m3	0.0063
12/2/2022 10:56	5 ppm	0.1899	0.1 mg/m3	0.0062
12/2/2022 10:57	5 ppm	0.1904	0.1 mg/m3	0.0061
12/2/2022 10:58	5 ppm	0.191	0.1 mg/m3	0.0061
12/2/2022 10:59	5 ppm	0.1917	0.1 mg/m3	0.006
12/2/2022 11:00	5 ppm	0.192	0.1 mg/m3	0.0059
12/2/2022 11:01	5 ppm	0.1925	0.1 mg/m3	0.0059
12/2/2022 11:02	5 ppm	0.1927	0.1 mg/m3	0.0058
12/2/2022 11:03	5 ppm	0.1932	0.1 mg/m3	0.0057
12/2/2022 11:04	5 ppm	0.1935	0.1 mg/m3	0.0057
12/2/2022 11:05	5 ppm	0.1941	0.1 mg/m3	0.0056

Notes:

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Air Monitoring Plan

Micellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

File: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 1: Station 2 Dust Monitor - November 18, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/18/2022 8:31	5 ppm	---	0.1 mg/m3	---
11/18/2022 8:32	5 ppm	0.027	0.1 mg/m3	---
11/18/2022 9:41	5 ppm	---	0.1 mg/m3	---
11/18/2022 9:42	5 ppm	0.138	0.1 mg/m3	0.01
11/18/2022 9:43	5 ppm	0.1415	0.1 mg/m3	0.01
11/18/2022 9:44	5 ppm	0.143	0.1 mg/m3	0.01
11/18/2022 9:45	5 ppm	0.1435	0.1 mg/m3	0.01
11/18/2022 9:46	5 ppm	0.1438	0.1 mg/m3	0.01
11/18/2022 9:47	5 ppm	0.1437	0.1 mg/m3	0.01
11/18/2022 9:48	5 ppm	0.1446	0.1 mg/m3	0.01
11/18/2022 9:49	5 ppm	0.1454	0.1 mg/m3	0.01
11/18/2022 9:50	5 ppm	0.1464	0.1 mg/m3	0.01
11/18/2022 10:53	5 ppm	---	0.1 mg/m3	---
11/18/2022 10:55	5 ppm	0.19	0.1 mg/m3	0.01
11/18/2022 10:56	5 ppm	0.1905	0.1 mg/m3	0.01
11/18/2022 10:57	5 ppm	0.1903	0.1 mg/m3	0.01
11/18/2022 10:58	5 ppm	0.191	0.1 mg/m3	0.01
11/18/2022 10:59	5 ppm	0.1916	0.1 mg/m3	0.01
11/18/2022 11:00	5 ppm	0.1917	0.1 mg/m3	0.01
11/18/2022 11:01	5 ppm	0.1916	0.1 mg/m3	0.01
11/18/2022 11:02	5 ppm	0.1925	0.1 mg/m3	0.01
11/18/2022 11:03	5 ppm	0.1932	0.1 mg/m3	0.01
11/18/2022 11:04	5 ppm	0.1933	0.1 mg/m3	0.01
11/18/2022 11:05	5 ppm	0.1936	0.1 mg/m3	0.01
11/18/2022 11:06	5 ppm	0.1937	0.1 mg/m3	0.01
11/18/2022 11:07	5 ppm	0.1942	0.1 mg/m3	0.01
11/18/2022 11:08	5 ppm	0.1943	0.1 mg/m3	0.013
11/18/2022 11:09	5 ppm	0.1945	0.1 mg/m3	0.013
11/18/2022 11:10	5 ppm	0.1951	0.1 mg/m3	0.013
11/18/2022 11:11	5 ppm	0.1957	0.1 mg/m3	0.013
11/18/2022 11:12	5 ppm	0.1961	0.1 mg/m3	0.013
11/18/2022 11:13	5 ppm	0.1969	0.1 mg/m3	0.013
11/18/2022 11:14	5 ppm	0.197	0.1 mg/m3	0.013
11/18/2022 11:15	5 ppm	0.1977	0.1 mg/m3	0.013
11/18/2022 11:16	5 ppm	0.1985	0.1 mg/m3	0.013
11/18/2022 11:17	5 ppm	0.1989	0.1 mg/m3	0.013

Notes

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0



Crawford & Associates Engineering, and Land Surveying, P.C.

Table 3: Station 2 Dust Monitor - November 22, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/22/2022 7:44	5 ppm	---	0.1 mg/m3	---
11/22/2022 7:45	5 ppm	0	0.1 mg/m3	0.474
11/22/2022 7:46	5 ppm	0	0.1 mg/m3	0.255
11/22/2022 7:47	5 ppm	0	0.1 mg/m3	0.184
11/22/2022 7:48	5 ppm	0	0.1 mg/m3	0.1485
11/22/2022 7:49	5 ppm	0	0.1 mg/m3	0.1262
11/22/2022 7:50	5 ppm	0	0.1 mg/m3	0.111
11/22/2022 7:51	5 ppm	0	0.1 mg/m3	0.1004
11/22/2022 7:52	5 ppm	0	0.1 mg/m3	0.0929
11/22/2022 7:53	5 ppm	0	0.1 mg/m3	0.0872
11/22/2022 7:54	5 ppm	0	0.1 mg/m3	0.083
11/22/2022 7:55	5 ppm	0	0.1 mg/m3	0.0797
11/22/2022 7:56	5 ppm	0	0.1 mg/m3	0.0771
11/22/2022 7:57	5 ppm	0	0.1 mg/m3	0.0746
11/22/2022 7:58	5 ppm	0	0.1 mg/m3	0.0723
11/22/2022 7:59	5 ppm	0	0.1 mg/m3	0.0697
11/22/2022 8:00	5 ppm	0	0.1 mg/m3	0.0404
11/22/2022 8:01	5 ppm	0	0.1 mg/m3	0.0403
11/22/2022 8:02	5 ppm	0	0.1 mg/m3	0.0402
11/22/2022 8:03	5 ppm	0	0.1 mg/m3	0.0396
11/22/2022 8:04	5 ppm	0	0.1 mg/m3	0.0391
11/22/2022 8:05	5 ppm	0	0.1 mg/m3	0.0388
11/22/2022 8:06	5 ppm	0	0.1 mg/m3	0.0386
11/22/2022 8:07	5 ppm	0	0.1 mg/m3	0.0382
11/22/2022 8:08	5 ppm	0	0.1 mg/m3	0.0374
11/22/2022 8:09	5 ppm	0	0.1 mg/m3	0.0364
11/22/2022 8:10	5 ppm	0	0.1 mg/m3	0.0353
11/22/2022 8:11	5 ppm	0	0.1 mg/m3	0.0339
11/22/2022 8:12	5 ppm	0	0.1 mg/m3	0.0331
11/22/2022 8:13	5 ppm	0	0.1 mg/m3	0.0326
11/22/2022 8:14	5 ppm	0	0.1 mg/m3	0.0326
11/22/2022 8:15	5 ppm	0	0.1 mg/m3	0.0324
11/22/2022 8:16	5 ppm	0.0001	0.1 mg/m3	0.0322
11/22/2022 8:17	5 ppm	0.0001	0.1 mg/m3	0.0315
11/22/2022 8:18	5 ppm	0.0001	0.1 mg/m3	0.0311
11/22/2022 8:19	5 ppm	0.0001	0.1 mg/m3	0.0311
11/22/2022 8:20	5 ppm	0.0003	0.1 mg/m3	0.0311
11/22/2022 8:21	5 ppm	0.0004	0.1 mg/m3	0.0309
11/22/2022 8:22	5 ppm	0.0006	0.1 mg/m3	0.0305
11/22/2022 8:23	5 ppm	0.0007	0.1 mg/m3	0.0304
11/22/2022 8:24	5 ppm	0.0012	0.1 mg/m3	0.0302
11/22/2022 8:25	5 ppm	0.0015	0.1 mg/m3	0.0299
11/22/2022 8:26	5 ppm	0.002	0.1 mg/m3	0.0297
11/22/2022 8:27	5 ppm	0.0026	0.1 mg/m3	0.0293
11/22/2022 8:28	5 ppm	0.0032	0.1 mg/m3	0.0287
11/22/2022 8:29	5 ppm	0.0041	0.1 mg/m3	0.0282
11/22/2022 8:30	5 ppm	0.0048	0.1 mg/m3	0.0279
11/22/2022 8:31	5 ppm	0.0057	0.1 mg/m3	0.0274
11/22/2022 8:32	5 ppm	0.0067	0.1 mg/m3	0.0271
11/22/2022 8:33	5 ppm	0.008	0.1 mg/m3	0.0269
11/22/2022 8:34	5 ppm	0.0089	0.1 mg/m3	0.0268
11/22/2022 8:35	5 ppm	0.01	0.1 mg/m3	0.0264
11/22/2022 8:36	5 ppm	0.0111	0.1 mg/m3	0.026
11/22/2022 8:37	5 ppm	0.0125	0.1 mg/m3	0.0257
11/22/2022 8:38	5 ppm	0.0138	0.1 mg/m3	0.0253
11/22/2022 9:40	5 ppm	---	0.1 mg/m3	---
11/22/2022 9:42	5 ppm	0.126	0.1 mg/m3	0.012
11/22/2022 9:43	5 ppm	0.1285	0.1 mg/m3	0.012
11/22/2022 9:44	5 ppm	0.13	0.1 mg/m3	0.0123
11/22/2022 9:45	5 ppm	0.1323	0.1 mg/m3	0.0125
11/22/2022 9:46	5 ppm	0.1342	0.1 mg/m3	0.0126
11/22/2022 9:47	5 ppm	0.136	0.1 mg/m3	0.0127
11/22/2022 9:48	5 ppm	0.1386	0.1 mg/m3	0.0127
11/22/2022 9:49	5 ppm	0.141	0.1 mg/m3	0.0128
11/22/2022 9:50	5 ppm	0.143	0.1 mg/m3	0.0128
11/22/2022 9:51	5 ppm	0.1453	0.1 mg/m3	0.0128
11/22/2022 9:52	5 ppm	0.1478	0.1 mg/m3	0.0128
11/22/2022 9:53	5 ppm	0.1499	0.1 mg/m3	0.0128
11/22/2022 9:54	5 ppm	0.1521	0.1 mg/m3	0.0128
11/22/2022 9:55	5 ppm	0.1543	0.1 mg/m3	0.0129
11/22/2022 9:56	5 ppm	0.1562	0.1 mg/m3	0.0129
11/22/2022 9:57	5 ppm	0.1603	0.1 mg/m3	0.0129
11/22/2022 9:58	5 ppm	0.1644	0.1 mg/m3	0.013
11/22/2022 9:59	5 ppm	0.1686	0.1 mg/m3	0.013
11/22/2022 10:00	5 ppm	0.1727	0.1 mg/m3	0.013
11/22/2022 10:01	5 ppm	0.1767	0.1 mg/m3	0.0131
11/22/2022 10:02	5 ppm	0.1805	0.1 mg/m3	0.0131
11/22/2022 10:03	5 ppm	0.1839	0.1 mg/m3	0.0131
11/22/2022 10:04	5 ppm	0.1876	0.1 mg/m3	0.0131
11/22/2022 10:05	5 ppm	0.1911	0.1 mg/m3	0.0131
11/22/2022 10:06	5 ppm	0.1947	0.1 mg/m3	0.013
11/22/2022 10:07	5 ppm	0.1977	0.1 mg/m3	0.0129
11/22/2022 10:08	5 ppm	0.2013	0.1 mg/m3	0.0129
11/22/2022 10:09	5 ppm	0.2049	0.1 mg/m3	0.0129
11/22/2022 10:10	5 ppm	0.2086	0.1 mg/m3	0.0129
11/22/2022 10:11	5 ppm	0.2128	0.1 mg/m3	0.0129
11/22/2022 10:12	5 ppm	0.2168	0.1 mg/m3	0.0129
11/22/2022 10:13	5 ppm	0.2208	0.1 mg/m3	0.0129
11/22/2022 10:14	5 ppm	0.2247	0.1 mg/m3	0.0129
11/22/2022 10:15	5 ppm	0.2287	0.1 mg/m3	0.0129
11/22/2022 10:16	5 ppm	0.2325	0.1 mg/m3	0.0128
11/22/2022 10:17	5 ppm	0.2367	0.1 mg/m3	0.0128
11/22/2022 10:18	5 ppm	0.2404	0.1 mg/m3	0.0128
11/22/2022 10:19	5 ppm	0.2437	0.1 mg/m3	0.0128
11/22/2022 10:20	5 ppm	0.2468	0.1 mg/m3	0.0128
11/22/2022 10:21	5 ppm	0.2498	0.1 mg/m3	0.0129
11/22/2022 10:22	5 ppm	0.2528	0.1 mg/m3	0.0129
11/22/2022 10:23	5 ppm	0.2551	0.1 mg/m3	0.013
11/22/2022 10:24	5 ppm	0.2571	0.1 mg/m3	0.013
11/22/2022 10:25	5 ppm	0.2588	0.1 mg/m3	0.013
11/22/2022 10:26	5 ppm	0.2601	0.1 mg/m3	0.013
11/22/2022 10:27	5 ppm	0.2613	0.1 mg/m3	0.013
11/22/2022 10:28	5 ppm	0.2626	0.1 mg/m3	0.013
11/22/2022 10:29	5 ppm	0.2635	0.1 mg/m3	0.013
11/22/2022 10:30	5 ppm	0.2643	0.1 mg/m3	0.013
11/22/2022 10:31	5 ppm	0.2656	0.1 mg/m3	0.013
11/22/2022 10:32	5 ppm	0.2663	0.1 mg/m3	0.013
11/22/2022 10:33	5 ppm	0.2675	0.1 mg/m3	0.013
11/22/2022 10:34	5 ppm	0.2685	0.1 mg/m3	0.013
11/22/2022 10:35	5 ppm	0.2696	0.1 mg/m3	0.013
11/22/2022 10:36	5 ppm	0.2705	0.1 mg/m3	0.013
11/22/2022 10:37	5 ppm	0.2713	0.1 mg/m3	0.0131
11/22/2022 10:38	5 ppm	0.2725	0.1 mg/m3	0.0131
11/22/2022 10:39	5 ppm	0.2737	0.1 mg/m3	0.0131
11/22/2022 10:40	5 ppm	0.2746	0.1 mg/m3	0.0131
11/22/2022 10:41	5 ppm	0.2756	0.1 mg/m3	0.0131
11/22/2022 10:42	5 ppm	0.2765	0.1 mg/m3	0.0131
11/22/2022 10:43	5 ppm	0.2772	0.1 mg/m3	0.0131
11/22/2022 10:44	5 ppm	0.2779	0.1 mg/m3	0.0131
11/22/2022 10:45	5 ppm	0.2785	0.1 mg/m3	0.0131
11/22/2022 10:46	5 ppm	0.2783	0.1 mg/m3	0.0131
11/22/2022 10:47	5 ppm	0.2784	0.1 mg/m3	0.0131
11/22/2022 10:48	5 ppm	0.2782	0.1 mg/m3	0.0131
11/22/2022 10:49	5 ppm	0.2783	0.1 mg/m3	0.0131
11/22/2022 10:50	5 ppm	0.2782	0.1 mg/m3	0.0131
11/22/2022 10:51	5 ppm	0.2781	0.1 mg/m3	0.0131
11/22/2022 10:52	5 ppm	0.2778	0.1 mg/m3	0.013
11/22/2022 10:53	5 ppm	0.2769	0.1 mg/m3	0.013
11/22/2022 10:54	5 ppm	0.276	0.1 mg/m3	0.013
11/22/2022 10:55	5 ppm	0.275	0.1 mg/m3	0.0131
11/22/2022 10:56	5 ppm	0.2738	0.1 mg/m3	0.0131
11/22/2022 10:57	5 ppm	0.2727	0.1 mg/m3	0.0131
11/22/2022 10:58	5 ppm	0.2711	0.1 mg/m3	0.013
11/22/2022 10:59	5 ppm	0.2696	0.1 mg/m3	0.0129
11/22/2022 11:00	5 ppm	0.2683	0.1 mg/m3	0.0129
11/22/2022 11:01	5 ppm	0.2671	0.1 mg/m3	0.0129
11/22/2022 11:02	5 ppm	0.2659	0.1 mg/m3	0.0129
11/22/2022 11:03	5 ppm	0.2651	0.1 mg/m3	0.0129
11/22/2022 11:04	5 ppm	0.264	0.1 mg/m3	0.0129
11/22/2022 11:05	5 ppm	0.2635	0.1 mg/m3	0.0129
11/22/2022 11:06	5 ppm	0.263	0.1 mg/m3	0.0129
11/22/2022 11:07	5 ppm	0.2627	0.1 mg/m3	0.0129
11/22/2022 11:08	5 ppm	0.2631	0.1 mg/m3	0.0129
11/22/2022 11:09	5 ppm	0.2637	0.1 mg/m3	0.0129
11/22/2022 11:10	5 ppm	0.2645	0.1 mg/m3	0.0129
11/22/2022 11:11	5 ppm	0.2653	0.1 mg/m3	0.0128
11/22/2022 11:12	5 ppm	0.2661	0.1 mg/m3	0.0128
11/22/2022 11:13	5 ppm	0.2671	0.1 mg/m3	0.0129
11/22/2022 11:14	5 ppm	0.2685	0.1 mg/m3	0.0129
11/22/2022 11:15	5 ppm	0.2697	0.1 mg/m3	0.0129
11/22/2022 11:16	5 ppm	0.2709	0.1 mg/m3	0.0129
11/22/2022 11:17	5 ppm	0.272	0.1 mg/m3	0.0129
11/22/2022 11:18	5 ppm	0.273	0.1 mg/m3	0.0129
11/22/2022 11:19	5 ppm	0.2741	0.1 mg/m3	0.0129
11/22/2022 11:20	5 ppm	0.275	0.1 mg/m3	0.013
11/22/2022 11:21	5 ppm	0.2757	0.1 mg/m3	0.0131
11/22/2022 11:22	5 ppm	0.2765	0.1 mg/m3	0.0131
11/22/2022 11:23	5 ppm	0.277	0.1 mg/m3	0.0131
11/22/2022 11:24	5 ppm	0.2774	0.1 mg/m3	0.0131
11/22/2022 11:25	5 ppm	0.2777	0.1 mg/m3	0.0131
11/22/2022 11:26	5 ppm	0.2781	0.1 mg/m3	0.0133
11/22/2022 11:27	5 ppm	0.2784	0.1 mg/m3	0.0133
11/22/2022 11:28	5 ppm	0.2789	0.1 mg/m3	0.0133
11/22/2022 11:29	5 ppm	0.2793	0.1 mg/m3	0.0133
11/22/2022 11:30	5 ppm	0.2795	0.1 mg/m3	0.0133
11/22/2022 11:31	5 ppm	0.28	0.1 mg/m3	0.0133
11/22/2022 11:32	5 ppm	0.2802	0.1 mg/m3	0.0133
11/22/2022 11:33	5 ppm	0.2803	0.1 mg/m3	0.0133
11/22/2022 11:34	5 ppm	0.2809	0.1 mg/m3	0.0133
11/22/2022 11:35	5 ppm	0.2811	0.1 mg/m3	0.0133
11/22/2022 11:36	5 ppm	0.2811	0.1 mg/m3	0.0132
11/22/2022 11:37	5 ppm	0.2813	0.1 mg/m3	0.0133
11/22/2022 11:38	5 ppm	0.2813	0.1 mg/m3	0.0133
11/22/2022 12:41	5 ppm	---	0.1 mg/m3	---
11/22/2022 12:42	5 ppm	0.217	0.1 mg/m3	0.012
11/22/2022 12:43	5 ppm	0.2155	0.1 mg/m3	0.0115
11/22/2022 12:44	5 ppm	0.2133	0.1 mg/m3	0.0117
11/22/2022 12:45	5 ppm	0.2135	0.1 mg/m3	0.0115
11/22/2022 12:46	5 ppm	0.2136	0.1 mg/m3	0.0114
11/22/2022 12:47	5 ppm	0.2128	0.1 mg/m3	0.0113
11/22/2022 12:48	5 ppm	0.213	0.1 mg/m3	0.0113
11/22/2022 12:49	5 ppm	0.2133	0.1 mg/m3	0.0112
11/22/2022 12:50	5 ppm	0.2138	0.1 mg/m3	0.0113
11/22/2022 12:51	5 ppm	0.2143	0.1 mg/m3	0.0114
11/22/2022 12:52	5 ppm	0.2146	0.1 mg/m3	0.0115
11/22/2022 12:53	5 ppm	0.2153	0.1 mg/m3	0.0114
11/22/2022 12:54	5 ppm	0.2157	0.1 mg/m3	0.0115
11/22/2022 12:55	5 ppm	0.2161	0.1 mg/m3	0.0114
11/22/2022 12:56	5 ppm	0.2167	0.1 mg/m3	0.0114
11/22/2022 12:57	5 ppm	0.2174	0.1 mg/m3	0.0113
11/22/2022 12:58	5 ppm	0.2181	0.1 mg/m3	0.0113
11/22/2022 12:59	5 ppm	0.2193	0.1 mg/m3	0.0114
11/22/2022 13:00	5 ppm	0.2202	0.1 mg/m3	0.0115
11/22/2022 13:01	5 ppm	0.2213	0.1 mg/m3	0.0115
11/22/2022 13:02	5 ppm	0.2227	0.1 mg/m3	0.0116
11/22/2022 13:03	5 ppm	0.2241	0.1 mg/m3	0.0117
11/22/2022 13:04	5 ppm	0.2253	0.1 mg/m3	0.0117
11/22/2022 13:05	5 ppm	0.2262	0.1 mg/m3	0.0116
11/22/2022 13:06	5 ppm	0.2273	0.1 mg/m3	0.0115
11/22/2022 13:07	5 ppm	0.2282	0.1 mg/m3	0.0115
11/22/2022 13:08	5 ppm	0.2288	0.1 mg/m3	0.0115
11/22/2022 13:09	5 ppm	0.2298	0.1 mg/m3	0.0115
11/22/2022 13:10	5 ppm	0.2309	0.1 mg/m3	0.0115
11/22/2022 13:11	5 ppm	0.2315	0.1 mg/m3	0.0115
11/22/2022 13:12	5 ppm	0.2317	0.1 mg/m3	0.0115
11/22/2022 13:13	5 ppm	0.2323	0.1 mg/m3	0.0116
11/22/2022 13:14	5 ppm	0.2328	0.1 mg/m3	0.0115
11/22/2022 13:15	5 ppm	0.2331	0.1 mg/m3	0.0115
11/22/2022 13:16	5 ppm	0.233	0.1 mg/m3	0.0115
11/22/2022 13:17	5 ppm	0.2329	0.1 mg/m3	0.0115
11/22/2022 13:18	5 ppm	0.2327	0.1 mg/m3	0.0115
11/22/2022 13:19	5 ppm	0.2326	0.1 mg/m3	0.0115
11/22/2022 13:20	5 ppm	0.2323	0.1 mg/m3	0.0115
11/22/2022 13:21	5 ppm	0.2321	0.1 mg/m3	0.0115
11/22/2022 13:22	5 ppm	0.2318	0.1 mg/m3	0.0115
11/22/2022 13:23	5 ppm	0.2315	0.1 mg/m3	0.0115
11/22/2022 13:24	5 ppm	0.2309	0.1 mg/m3	0.0115
11/22/2022 13:25	5 ppm	0.2301	0.1 mg/m3	0.0114
11/22/2022 13:26	5 ppm	0.2292	0.1 mg/m3	0.0114
11/22/2022 13:27	5 ppm	0.2285	0.1 mg/m3	0.0113
11/22/2022 13:28	5 ppm	0.2276	0.1 mg/m3	0.0113
11/22/2022 13:29	5 ppm	0.2266	0.1 mg/m3	0.0112
11/22/2022 13:30	5 ppm	0.2258	0.1 mg/m3	0.0111
11/22/2022 13:31	5 ppm	0.2251	0.1 mg/m3	0.0111
11/22/2022 13:32	5 ppm	0.2241	0.1 mg/m3	0.011
11/22/2022 13:33	5 ppm	0.2229	0.1 mg/m3	0.011
11/22/2022 13:34	5 ppm	0.2217	0.1 mg/m3	0.0109
11/22/2022 13:35	5 ppm	0.2208	0.1 mg/m3	0.011
11/22/2022 13:36	5 ppm	0.2193	0.1 mg/m3	0.011
11/22/2022 13:37	5 ppm	0.2181	0.1 mg/m3	0.011
11/22/2022 13:38	5 ppm	0.2171	0.1 mg/m3	0.011
11/22/2022 13:39	5 ppm	0.2162	0.1 mg/m3	0.011

Notes

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 4: Station 2 Dust Monitor - November 23, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/23/2022 7:59	5 ppm	---	0.1 mg/m3	---
11/23/2022 8:00	5 ppm	0	0.1 mg/m3	---
11/23/2022 8:01	5 ppm	0	0.1 mg/m3	0.025
11/23/2022 8:02	5 ppm	0	0.1 mg/m3	0.0455
11/23/2022 8:03	5 ppm	0	0.1 mg/m3	0.039
11/23/2022 8:04	5 ppm	0	0.1 mg/m3	0.0358
11/23/2022 8:05	5 ppm	0	0.1 mg/m3	0.0338
11/23/2022 8:06	5 ppm	0	0.1 mg/m3	0.0325
11/23/2022 8:07	5 ppm	0	0.1 mg/m3	0.0313
11/23/2022 8:08	5 ppm	0	0.1 mg/m3	0.0304
11/23/2022 8:09	5 ppm	0	0.1 mg/m3	0.0298
11/23/2022 8:10	5 ppm	0	0.1 mg/m3	0.0294
11/23/2022 8:11	5 ppm	0	0.1 mg/m3	0.0291
11/23/2022 8:12	5 ppm	0	0.1 mg/m3	0.0288
11/23/2022 8:13	5 ppm	0	0.1 mg/m3	0.0285
11/23/2022 8:14	5 ppm	0	0.1 mg/m3	0.0284
11/23/2022 8:15	5 ppm	0	0.1 mg/m3	0.0283
11/23/2022 8:16	5 ppm	0	0.1 mg/m3	0.0284
11/23/2022 8:17	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:18	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:19	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:20	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:21	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:22	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:23	5 ppm	0	0.1 mg/m3	0.0258
11/23/2022 8:24	5 ppm	0	0.1 mg/m3	0.0258
11/23/2022 8:25	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:26	5 ppm	0	0.1 mg/m3	0.0257
11/23/2022 8:27	5 ppm	0	0.1 mg/m3	0.0259
11/23/2022 8:28	5 ppm	0	0.1 mg/m3	0.0259
11/23/2022 8:29	5 ppm	0	0.1 mg/m3	0.0259
11/23/2022 8:30	5 ppm	0	0.1 mg/m3	0.0259
11/23/2022 8:31	5 ppm	0	0.1 mg/m3	0.0259
11/23/2022 8:32	5 ppm	0	0.1 mg/m3	0.0261
11/23/2022 8:33	5 ppm	0	0.1 mg/m3	0.0262
11/23/2022 8:34	5 ppm	0	0.1 mg/m3	0.0264
11/23/2022 8:35	5 ppm	0	0.1 mg/m3	0.0265
11/23/2022 8:36	5 ppm	0	0.1 mg/m3	0.0267
11/23/2022 8:37	5 ppm	0	0.1 mg/m3	0.0268
11/23/2022 8:38	5 ppm	0	0.1 mg/m3	0.027
11/23/2022 8:39	5 ppm	0	0.1 mg/m3	0.0272
11/23/2022 8:40	5 ppm	0	0.1 mg/m3	0.0273
11/23/2022 8:41	5 ppm	0	0.1 mg/m3	0.0275
11/23/2022 8:42	5 ppm	0	0.1 mg/m3	0.0275
11/23/2022 8:43	5 ppm	0	0.1 mg/m3	0.0275
11/23/2022 8:44	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:45	5 ppm	0	0.1 mg/m3	0.0277
11/23/2022 8:46	5 ppm	0	0.1 mg/m3	0.0277
11/23/2022 8:47	5 ppm	0	0.1 mg/m3	0.0277
11/23/2022 8:48	5 ppm	0	0.1 mg/m3	0.0277
11/23/2022 8:49	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:50	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:51	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:52	5 ppm	0	0.1 mg/m3	0.0277
11/23/2022 8:53	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:54	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:55	5 ppm	0	0.1 mg/m3	0.0276
11/23/2022 8:56	5 ppm	0	0.1 mg/m3	0.0275
11/23/2022 8:57	5 ppm	0	0.1 mg/m3	0.0275
11/23/2022 10:00	5 ppm	---	0.1 mg/m3	---
11/23/2022 10:01	5 ppm	0.131	0.1 mg/m3	0.028
11/23/2022 10:02	5 ppm	0.1315	0.1 mg/m3	0.029
11/23/2022 10:03	5 ppm	0.1323	0.1 mg/m3	0.0293
11/23/2022 10:04	5 ppm	0.1333	0.1 mg/m3	0.0293
11/23/2022 10:05	5 ppm	0.1338	0.1 mg/m3	0.0294
11/23/2022 10:06	5 ppm	0.1357	0.1 mg/m3	0.0298
11/23/2022 10:07	5 ppm	0.1369	0.1 mg/m3	0.0299
11/23/2022 10:08	5 ppm	0.138	0.1 mg/m3	0.0295
11/23/2022 10:09	5 ppm	0.1392	0.1 mg/m3	0.0292
11/23/2022 10:10	5 ppm	0.1401	0.1 mg/m3	0.029
11/23/2022 10:11	5 ppm	0.1411	0.1 mg/m3	0.0288
11/23/2022 10:12	5 ppm	0.142	0.1 mg/m3	0.0286
11/23/2022 10:13	5 ppm	0.1431	0.1 mg/m3	0.0284
11/23/2022 10:14	5 ppm	0.1441	0.1 mg/m3	0.0281
11/23/2022 10:15	5 ppm	0.1449	0.1 mg/m3	0.0279
11/23/2022 10:16	5 ppm	0.147	0.1 mg/m3	0.0277
11/23/2022 10:17	5 ppm	0.149	0.1 mg/m3	0.0273
11/23/2022 10:18	5 ppm	0.1513	0.1 mg/m3	0.0269
11/23/2022 10:19	5 ppm	0.1532	0.1 mg/m3	0.0267
11/23/2022 10:20	5 ppm	0.1551	0.1 mg/m3	0.0263
11/23/2022 10:21	5 ppm	0.1567	0.1 mg/m3	0.0259
11/23/2022 10:22	5 ppm	0.1585	0.1 mg/m3	0.0255
11/23/2022 10:23	5 ppm	0.1601	0.1 mg/m3	0.0254
11/23/2022 10:24	5 ppm	0.1615	0.1 mg/m3	0.0253
11/23/2022 10:25	5 ppm	0.1627	0.1 mg/m3	0.0251
11/23/2022 10:26	5 ppm	0.1641	0.1 mg/m3	0.0251
11/23/2022 10:27	5 ppm	0.1651	0.1 mg/m3	0.0251
11/23/2022 10:28	5 ppm	0.1663	0.1 mg/m3	0.0251
11/23/2022 10:29	5 ppm	0.1673	0.1 mg/m3	0.0251
11/23/2022 10:30	5 ppm	0.1681	0.1 mg/m3	0.0252
11/23/2022 10:31	5 ppm	0.1685	0.1 mg/m3	0.0253
11/23/2022 10:32	5 ppm	0.169	0.1 mg/m3	0.0255
11/23/2022 10:33	5 ppm	0.1691	0.1 mg/m3	0.0256
11/23/2022 10:34	5 ppm	0.1696	0.1 mg/m3	0.0257
11/23/2022 10:35	5 ppm	0.1701	0.1 mg/m3	0.0259
11/23/2022 10:36	5 ppm	0.1703	0.1 mg/m3	0.026
11/23/2022 10:37	5 ppm	0.1705	0.1 mg/m3	0.0261
11/23/2022 10:38	5 ppm	0.1707	0.1 mg/m3	0.0263
11/23/2022 10:39	5 ppm	0.1711	0.1 mg/m3	0.0265
11/23/2022 10:40	5 ppm	0.1714	0.1 mg/m3	0.0267
11/23/2022 10:41	5 ppm	0.1715	0.1 mg/m3	0.0268
11/23/2022 10:42	5 ppm	0.1717	0.1 mg/m3	0.0269
11/23/2022 10:43	5 ppm	0.1715	0.1 mg/m3	0.0271
11/23/2022 10:44	5 ppm	0.1715	0.1 mg/m3	0.0273
11/23/2022 10:45	5 ppm	0.1717	0.1 mg/m3	0.0275
11/23/2022 10:46	5 ppm	0.1722	0.1 mg/m3	0.0278
11/23/2022 10:47	5 ppm	0.1726	0.1 mg/m3	0.0281
11/23/2022 10:48	5 ppm	0.1727	0.1 mg/m3	0.0283
11/23/2022 10:49	5 ppm	0.1731	0.1 mg/m3	0.0286
11/23/2022 10:50	5 ppm	0.1731	0.1 mg/m3	0.0287
11/23/2022 10:51	5 ppm	0.1734	0.1 mg/m3	0.0289
11/23/2022 10:52	5 ppm	0.1737	0.1 mg/m3	0.0291
11/23/2022 10:53	5 ppm	0.1743	0.1 mg/m3	0.0293
11/23/2022 10:54	5 ppm	0.1745	0.1 mg/m3	0.0296
11/23/2022 10:55	5 ppm	0.1751	0.1 mg/m3	0.0298
11/23/2022 10:56	5 ppm	0.1754	0.1 mg/m3	0.03
11/23/2022 10:57	5 ppm	0.176	0.1 mg/m3	0.0302
11/23/2022 10:58	5 ppm	0.1762	0.1 mg/m3	0.0303
11/23/2022 10:59	5 ppm	0.1767	0.1 mg/m3	0.0304
11/23/2022 11:00	5 ppm	0.1772	0.1 mg/m3	0.0306
11/23/2022 11:01	5 ppm	0.1777	0.1 mg/m3	0.0307
11/23/2022 11:02	5 ppm	0.1783	0.1 mg/m3	0.0307
11/23/2022 11:03	5 ppm	0.1787	0.1 mg/m3	0.0307
11/23/2022 11:04	5 ppm	0.1792	0.1 mg/m3	0.0307
11/23/2022 11:05	5 ppm	0.1799	0.1 mg/m3	0.0308
11/23/2022 11:06	5 ppm	0.1808	0.1 mg/m3	0.0309
11/23/2022 11:07	5 ppm	0.1816	0.1 mg/m3	0.0311
11/23/2022 11:08	5 ppm	0.1823	0.1 mg/m3	0.0311
11/23/2022 11:09	5 ppm	0.1831	0.1 mg/m3	0.0311
11/23/2022 11:10	5 ppm	0.1839	0.1 mg/m3	0.0312
11/23/2022 11:11	5 ppm	0.1849	0.1 mg/m3	0.0311
11/23/2022 11:12	5 ppm	0.1856	0.1 mg/m3	0.0311
11/23/2022 11:13	5 ppm	0.1873	0.1 mg/m3	0.0311
11/23/2022 11:14	5 ppm	0.1885	0.1 mg/m3	0.0311
11/23/2022 11:15	5 ppm	0.1895	0.1 mg/m3	0.0311
11/23/2022 11:16	5 ppm	0.1902	0.1 mg/m3	0.0311
11/23/2022 11:17	5 ppm	0.1909	0.1 mg/m3	0.0312
11/23/2022 11:18	5 ppm	0.1921	0.1 mg/m3	0.0313
11/23/2022 11:19	5 ppm	0.1932	0.1 mg/m3	0.0314
11/23/2022 11:20	5 ppm	0.1941	0.1 mg/m3	0.0315
11/23/2022 11:21	5 ppm	0.1949	0.1 mg/m3	0.0315
11/23/2022 11:22	5 ppm	0.1958	0.1 mg/m3	0.0315
11/23/2022 11:23	5 ppm	0.1963	0.1 mg/m3	0.0315
11/23/2022 11:24	5 ppm	0.1972	0.1 mg/m3	0.0315
11/23/2022 11:25	5 ppm	0.1979	0.1 mg/m3	0.0316
11/23/2022 11:26	5 ppm	0.1986	0.1 mg/m3	0.0319
11/23/2022 11:27	5 ppm	0.1995	0.1 mg/m3	0.0321
11/23/2022 11:28	5 ppm	0.1999	0.1 mg/m3	0.0323
11/23/2022 11:29	5 ppm	0.2005	0.1 mg/m3	0.0324
11/23/2022 11:30	5 ppm	0.2015	0.1 mg/m3	0.0325
11/23/2022 11:31	5 ppm	0.2025	0.1 mg/m3	0.0326
11/23/2022 11:32	5 ppm	0.2034	0.1 mg/m3	0.0327
11/23/2022 11:33	5 ppm	0.2039	0.1 mg/m3	0.0327
11/23/2022 11:34	5 ppm	0.2046	0.1 mg/m3	0.0328
11/23/2022 11:35	5 ppm	0.2054	0.1 mg/m3	0.0329
11/23/2022 11:36	5 ppm	0.2056	0.1 mg/m3	0.033
11/23/2022 11:37	5 ppm	0.2057	0.1 mg/m3	0.0331
11/23/2022 11:38	5 ppm	0.2062	0.1 mg/m3	0.0333
11/23/2022 11:39	5 ppm	0.2062	0.1 mg/m3	0.0334
11/23/2022 11:40	5 ppm	0.2063	0.1 mg/m3	0.0335
11/23/2022 11:41	5 ppm	0.2063	0.1 mg/m3	0.0335
11/23/2022 11:42	5 ppm	0.2064	0.1 mg/m3	0.0335
11/23/2022 11:43	5 ppm	0.2061	0.1 mg/m3	0.0336
11/23/2022 11:44	5 ppm	0.2056	0.1 mg/m3	0.0337
11/23/2022 11:45	5 ppm	0.2047	0.1 mg/m3	0.0338
11/23/2022 11:46	5 ppm	0.2039	0.1 mg/m3	0.0339
11/23/2022 11:47	5 ppm	0.2034	0.1 mg/m3	0.0339
11/23/2022 11:48	5 ppm	0.2031	0.1 mg/m3	0.034
11/23/2022 11:49	5 ppm	0.2023	0.1 mg/m3	0.0341
11/23/2022 11:50	5 ppm	0.2015	0.1 mg/m3	0.0341
11/23/2022 11:51	5 ppm	0.2007	0.1 mg/m3	0.0341
11/23/2022 11:52	5 ppm	0.1999	0.1 mg/m3	0.0342
11/23/2022 11:53	5 ppm	0.1991	0.1 mg/m3	0.0342
11/23/2022 11:54	5 ppm	0.1981	0.1 mg/m3	0.0343
11/23/2022 11:55	5 ppm	0.1973	0.1 mg/m3	0.0343
11/23/2022 11:56	5 ppm	0.1964	0.1 mg/m3	0.0343
11/23/2022 11:57	5 ppm	0.1957	0.1 mg/m3	0.0345
11/23/2022 11:58	5 ppm	0.1949	0.1 mg/m3	0.0346
11/23/2022 11:59	5 ppm	0.1945	0.1 mg/m3	0.0347
11/23/2022 12:00	5 ppm	0.1939	0.1 mg/m3	0.0347
11/23/2022 12:01	5 ppm	0.1934	0.1 mg/m3	0.0349
11/23/2022 12:02	5 ppm	0.1923	0.1 mg/m3	0.0349
11/23/2022 12:03	5 ppm	0.1911	0.1 mg/m3	0.035
11/23/2022 12:04	5 ppm	0.1901	0.1 mg/m3	0.0351
11/23/2022 12:05	5 ppm	0.1895	0.1 mg/m3	0.0353
11/23/2022 12:06	5 ppm	0.1887	0.1 mg/m3	0.0354
11/23/2022 12:07	5 ppm	0.188	0.1 mg/m3	0.0355
11/23/2022 12:08	5 ppm	0.1875	0.1 mg/m3	0.0356
11/23/2022 12:09	5 ppm	0.1868	0.1 mg/m3	0.0357
11/23/2022 12:10	5 ppm	0.1862	0.1 mg/m3	0.0357
11/23/2022 12:11	5 ppm	0.1859	0.1 mg/m3	0.0359
11/23/2022 12:12	5 ppm	0.1853	0.1 mg/m3	0.0359
11/23/2022 12:13	5 ppm	0.1849	0.1 mg/m3	0.0363
11/23/2022 12:14	5 ppm	0.1843	0.1 mg/m3	0.0365
11/23/2022 12:15	5 ppm	0.1837	0.1 mg/m3	0.0365
11/23/2022 12:16	5 ppm	0.1831	0.1 mg/m3	0.0365
11/23/2022 12:17	5 ppm	0.1826	0.1 mg/m3	0.0365
11/23/2022 12:18	5 ppm	0.1826	0.1 mg/m3	0.0367
11/23/2022 12:19	5 ppm	0.1828	0.1 mg/m3	0.0368
11/23/2022 12:20	5 ppm	0.1825	0.1 mg/m3	0.037
11/23/2022 12:21	5 ppm	0.1823	0.1 mg/m3	0.0371
11/23/2022 12:22	5 ppm	0.1821	0.1 mg/m3	0.0371
11/23/2022 12:23	5 ppm	0.1815	0.1 mg/m3	0.0371
11/23/2022 12:24	5 ppm	0.1817	0.1 mg/m3	0.0371
11/23/2022 12:25	5 ppm	0.1815	0.1 mg/m3	0.0372
11/23/2022 12:26	5 ppm	0.1812	0.1 mg/m3	0.0372
11/23/2022 12:27	5 ppm	0.1811	0.1 mg/m3	0.0371
11/23/2022 12:28	5 ppm	0.1811	0.1 mg/m3	0.0369
11/23/2022 12:29	5 ppm	0.1814	0.1 mg/m3	0.0367
11/23/2022 12:30	5 ppm	0.1816	0.1 mg/m3	0.0368
11/23/2022 12:31	5 ppm	0.1819	0.1 mg/m3	0.0369
11/23/2022 12:32	5 ppm	0.1822	0.1 mg/m3	0.0369
11/23/2022 12:33	5 ppm	0.1825	0.1 mg/m3	0.0373
11/23/2022 12:34	5 ppm	0.1827	0.1 mg/m3	0.0379
11/23/2022 12:35	5 ppm	0.183	0.1 mg/m3	0.0384
11/23/2022 12:36	5 ppm	0.1837	0.1 mg/m3	0.0388
11/23/2022 12:37	5 ppm	0.1843	0.1 mg/m3	0.0391
11/23/2022 12:38	5 ppm	0.1854	0.1 mg/m3	0.0392
11/23/2022 12:39	5 ppm	0.1861	0.1 mg/m3	0.0391
11/23/2022 12:40	5 ppm	0.1869	0.1 mg/m3	0.0395
11/23/2022 12:41	5 ppm	0.1878	0.1 mg/m3	0.0395
11/23/2022 12:42	5 ppm	0.1887	0.1 mg/m3	0.0396
11/23/2022 12:43	5 ppm	0.1897	0.1 mg/m3	0.0395
11/23/2022 12:44	5 ppm	0.1908	0.1 mg/m3	0.0395
11/23/2022 12:45	5 ppm	0.192	0.1 mg/m3	0.0395
11/23/2022 12:46	5 ppm	0.1934	0.1 mg/m3	0.0394
11/23/2022 12:47	5 ppm	0.1949	0.1 mg/m3	0.0393
11/23/2022 12:48	5 ppm	0.1963	0.1 mg/m3	0.0389
11/23/2022 12:49	5 ppm	0.1976	0.1 mg/m3	0.0383
11/23/2022 12:50	5 ppm	0.1989	0.1 mg/m3	0.0379
11/23/2022 12:51	5 ppm	0.2003	0.1 mg/m3	0.0377
11/23/2022 12:52	5 ppm	0.2013	0.1 mg/m3	0.0377
11/23/2022 12:53	5 ppm	0.2022	0.1 mg/m3	0.0377
11/23/2022 12:54	5 ppm	0.2034	0.1 mg/m3	0.0377
11/23/2022 12:55	5 ppm	0.2047	0.1 mg/m3	0.0373
11/23/2022 12:56	5 ppm	0.2055	0.1 mg/m3	0.0372
11/23/2022 12:57	5 ppm	0.2061	0.1 mg/m3	0.0373
11/23/2022 12:58	5 ppm	0.2067	0.1 mg/m3	0.0383
11/23/2022 12:59	5 ppm	0.2071	0.1 mg/m3	0.0388
11/23/2022 13:00	5 ppm	0.2077	0.1 mg/m3	0.0389
11/23/2022 13:01	5 ppm	0.2079	0.1 mg/m3	0.0389
11/23/2022 13:02	5 ppm	0.2079	0.1 mg/m3	0.0389
11/23/2022 13:03	5 ppm	0.2079	0.1 mg/m3	0.0389
11/23/2022 13:04	5 ppm	0.2078	0.1 mg/m3	0.0387
11/23/2022 13:05	5 ppm	0.2078	0.1 mg/m3	0.0389
11/23/2022 13:06	5 ppm	0.2077	0.1 mg/m3	0.0387
11/23/2022 13:07	5 ppm	0.2078	0.1 mg/m3	0.0385
11/23/2022 13:08	5 ppm	0.2079	0.1 mg/m3	0.0385
11/23/2022 13:09	5 ppm	0.2075	0.1 mg/m3	0.0386
11/23/2022 13:10	5 ppm	0.2071	0.1 mg/m3	0.0386
11/23/2022 13:11	5 ppm	0.2071	0.1 mg/m3	0.0386
11/23/2022 13:12	5 ppm	0.2072	0.1 mg/m3	0.0385
11/23/2022 13:13	5 ppm	0.2072	0.1 mg/m3	0.0375
11/23/2022 13:14	5 ppm	0.207	0.1 mg/m3	0.0369
11/23/2022 13:15	5 ppm	0.2068	0.1 mg/m3	0.0369
11/23/2022 13:16	5 ppm	0.2066	0.1 mg/m3	0.0369
11/23/2022 13:17	5 ppm	0.2063	0.1 mg/m3	0.037
11/23/2022 13:18	5 ppm	0.2057	0.1 mg/m3	0.0371
11/23/2022 13:19	5 ppm	0.2055	0.1 mg/m3	0.0371
11/23/2022 13:20	5 ppm	0.205	0.1 mg/m3	0.0366
11/23/2022 13:21	5 ppm	0.2046	0.1 mg/m3	0.0365
11/23/2022 13:22	5 ppm	0.2043	0.1 mg/m3	0.0361
11/23/2022 13:23	5 ppm	0.2038	0.1 mg/m3	0.0359
11/23/2022 13:24	5 ppm	0.2039	0.1 mg/m3	0.0355
11/23/2022 13:25	5 ppm	0.2039	0.1 mg/m3	0.0351
11/23/2022 13:26	5 ppm	0.2038	0.1 mg/m3	0.0347
11/23/2022 13:27	5 ppm	0.2035	0.1 mg/m3	0.0343
11/23/2022 13:28	5 ppm	0.2031	0.1 mg/m3	0.0339
11/23/2022 13:29	5 ppm	0.2027	0.1 mg/m3	0.0334
11/23/2022 13:30	5 ppm	0.2023	0.1 mg/m3	0.0328
11/23/2022 13:31	5 ppm	0.2019	0.1 mg/m3	0.0323
11/23/2022 13:32	5 ppm	0.2016	0.1 mg/m3	0.0319
11/23/2022 13:33	5 ppm	0.2018	0.1 mg/m3	0.0315
11/23/2022 13:34	5 ppm	0.2019	0.1 mg/m3	0.0311
11/23/2022 13:35	5 ppm	0.2019	0.1 mg/m3	0.0307
11/23/2022 13:36	5 ppm	0.2021	0.1 mg/m3	0.0303
11/23/2022 13:37	5 ppm	0.2023	0.1 mg/m3	0.0301
11/23/2022 13:38	5 ppm	0.2023	0.1 mg/m3	0.0299
11/23/2022 13:39	5 ppm	0.2018	0.1 mg/m3	0.0297
11/23/2022 13:40	5 ppm	0.2015	0.1 mg/m3	0.0295
11/23/2022 13:41	5 ppm	0.2013	0.1 mg/m3	0.0295
11/23/2022 13:42	5 ppm	0.2011	0.1 mg/m3	0.0294
11/23/2022 13:43	5 ppm	0.2011	0.1 mg/m3	0.0294
11/23/2022 13:44	5 ppm	0.2013	0.1 mg/m3	0.0296
11/23/2022 13:45	5 ppm	0.2017	0.1 mg/m3	0.0297
11/23/2022 13:46	5 ppm	0.2021	0.1 mg/m3	0.0298
11/23/2022 13:47	5 ppm	0.2023	0.1 mg/m3	0.0321

Notes

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 5: Station 2 Dust Monitor - November 28, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/28/2022 8:13	5 ppm	---	0.1 mg/m3	---
11/28/2022 8:14	5 ppm	0	0.1 mg/m3	---
11/28/2022 8:15	5 ppm	0	0.1 mg/m3	0.003
11/28/2022 8:16	5 ppm	0	0.1 mg/m3	0.002
11/28/2022 8:17	5 ppm	0	0.1 mg/m3	0.003
11/28/2022 8:18	5 ppm	0	0.1 mg/m3	0.0025
11/28/2022 8:19	5 ppm	0	0.1 mg/m3	0.0022
11/28/2022 8:20	5 ppm	0	0.1 mg/m3	0.002
11/28/2022 8:21	5 ppm	0	0.1 mg/m3	0.002
11/28/2022 8:22	5 ppm	0	0.1 mg/m3	0.0019
11/28/2022 8:23	5 ppm	0	0.1 mg/m3	0.0018
11/28/2022 8:24	5 ppm	0	0.1 mg/m3	0.0017
11/28/2022 10:31	5 ppm	---	0.1 mg/m3	---
11/28/2022 10:32	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:33	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:34	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:35	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:36	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:37	5 ppm	---	0.1 mg/m3	0.006
11/28/2022 10:38	5 ppm	---	0.1 mg/m3	0.0059
11/28/2022 10:39	5 ppm	---	0.1 mg/m3	0.0057
11/28/2022 10:40	5 ppm	---	0.1 mg/m3	0.0058
11/28/2022 10:41	5 ppm	---	0.1 mg/m3	0.0057
11/28/2022 10:42	5 ppm	---	0.1 mg/m3	0.0057
11/28/2022 10:43	5 ppm	---	0.1 mg/m3	0.0057
11/28/2022 10:44	5 ppm	---	0.1 mg/m3	0.0056
11/28/2022 10:45	5 ppm	---	0.1 mg/m3	0.0056
11/28/2022 10:46	5 ppm	---	0.1 mg/m3	0.0056
11/28/2022 10:47	5 ppm	---	0.1 mg/m3	0.0055
11/28/2022 10:48	5 ppm	---	0.1 mg/m3	0.0055
11/28/2022 11:52	5 ppm	---	0.1 mg/m3	---
11/28/2022 11:53	5 ppm	0.182	0.1 mg/m3	---
11/28/2022 11:54	5 ppm	0.182	0.1 mg/m3	0.008
11/28/2022 11:55	5 ppm	0.184	0.1 mg/m3	0.008
11/28/2022 11:56	5 ppm	0.184	0.1 mg/m3	0.008
11/28/2022 11:57	5 ppm	0.1842	0.1 mg/m3	0.008
11/28/2022 11:58	5 ppm	0.184	0.1 mg/m3	0.008
11/28/2022 11:59	5 ppm	0.1843	0.1 mg/m3	0.008
11/28/2022 12:00	5 ppm	0.1844	0.1 mg/m3	0.008
11/28/2022 12:01	5 ppm	0.1848	0.1 mg/m3	0.008
11/28/2022 12:02	5 ppm	0.1848	0.1 mg/m3	0.008
11/28/2022 12:03	5 ppm	0.1847	0.1 mg/m3	0.008
11/28/2022 12:04	5 ppm	0.185	0.1 mg/m3	0.008
11/28/2022 12:05	5 ppm	0.1851	0.1 mg/m3	0.008
11/28/2022 12:06	5 ppm	0.185	0.1 mg/m3	0.008
11/28/2022 12:07	5 ppm	0.1849	0.1 mg/m3	0.008
11/28/2022 13:10	5 ppm	---	0.1 mg/m3	---
11/28/2022 13:11	5 ppm	0.168	0.1 mg/m3	0.005
11/28/2022 13:12	5 ppm	0.1675	0.1 mg/m3	0.005
11/28/2022 13:13	5 ppm	0.167	0.1 mg/m3	0.0053
11/28/2022 13:14	5 ppm	0.1663	0.1 mg/m3	0.0053
11/28/2022 13:15	5 ppm	0.1672	0.1 mg/m3	0.0052
11/28/2022 13:16	5 ppm	0.1673	0.1 mg/m3	0.0052
11/28/2022 13:17	5 ppm	0.1673	0.1 mg/m3	0.0051
11/28/2022 13:18	5 ppm	0.1671	0.1 mg/m3	0.0051
11/28/2022 13:19	5 ppm	0.1671	0.1 mg/m3	0.0051
11/28/2022 13:20	5 ppm	0.1668	0.1 mg/m3	0.0051
11/28/2022 13:21	5 ppm	0.1666	0.1 mg/m3	0.0051
11/28/2022 13:22	5 ppm	0.1667	0.1 mg/m3	0.0051
11/28/2022 13:23	5 ppm	0.1667	0.1 mg/m3	0.0051
11/28/2022 13:24	5 ppm	0.1668	0.1 mg/m3	0.0051
11/28/2022 13:25	5 ppm	0.1669	0.1 mg/m3	0.0051
11/28/2022 13:26	5 ppm	0.167	0.1 mg/m3	0.0051
11/28/2022 13:27	5 ppm	0.1675	0.1 mg/m3	0.0051
11/28/2022 13:28	5 ppm	0.1677	0.1 mg/m3	0.005
11/28/2022 13:29	5 ppm	0.1679	0.1 mg/m3	0.005
11/28/2022 13:30	5 ppm	0.1677	0.1 mg/m3	0.005
11/28/2022 13:31	5 ppm	0.1674	0.1 mg/m3	0.005
11/28/2022 13:32	5 ppm	0.1677	0.1 mg/m3	0.005
11/28/2022 13:33	5 ppm	0.1678	0.1 mg/m3	0.005
11/28/2022 13:34	5 ppm	0.1679	0.1 mg/m3	0.0049
11/28/2022 13:35	5 ppm	0.1681	0.1 mg/m3	0.0049
11/28/2022 13:36	5 ppm	0.1685	0.1 mg/m3	0.0048
11/28/2022 13:37	5 ppm	0.1687	0.1 mg/m3	0.0047
11/28/2022 13:38	5 ppm	0.1688	0.1 mg/m3	0.0047
11/28/2022 13:39	5 ppm	0.1687	0.1 mg/m3	0.0047
11/28/2022 13:40	5 ppm	0.1688	0.1 mg/m3	0.0046
11/28/2022 13:41	5 ppm	0.1689	0.1 mg/m3	0.0045
11/28/2022 13:42	5 ppm	0.1685	0.1 mg/m3	0.0045

Notes

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 1: Station 3 Dust Monitor - November 18, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/18/2022 8:39	5 ppm	---	0.1 mg/m3	---
11/18/2022 8:40	5 ppm	---	0.1 mg/m3	---
11/18/2022 8:41	5 ppm	---	0.1 mg/m3	0.398
11/18/2022 8:42	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:43	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:44	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:45	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:46	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:47	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:48	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:49	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:50	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:51	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:52	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:53	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:54	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:55	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:56	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:57	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:58	5 ppm	0	0.1 mg/m3	---
11/18/2022 8:59	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:00	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:01	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:02	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:03	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:04	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:05	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:06	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:07	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:08	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:09	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:10	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:11	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:12	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:13	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:14	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:15	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:16	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:17	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:18	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:19	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:20	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:21	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:22	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:23	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:24	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:25	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:26	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:27	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:28	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:29	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:30	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:31	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:32	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:33	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:34	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:35	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:36	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:37	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:38	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:39	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:40	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:41	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:42	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:43	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:44	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:45	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:46	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:47	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:48	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:49	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:50	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:51	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:52	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:53	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:54	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:55	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:56	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:57	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:58	5 ppm	0	0.1 mg/m3	---
11/18/2022 9:59	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:00	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:01	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:02	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:03	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:04	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:05	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:06	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:07	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:08	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:09	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:10	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:11	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:12	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:13	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:14	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:15	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:16	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:17	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:18	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:19	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:20	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:21	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:22	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:23	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:24	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:25	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:26	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:27	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:28	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:29	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:30	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:31	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:32	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:33	5 ppm	0.0005	0.1 mg/m3	---
11/18/2022 10:34	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:35	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:36	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:37	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:38	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:39	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:40	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:41	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:42	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:43	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:44	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:45	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:46	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:47	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:48	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:49	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:50	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:51	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:52	5 ppm	0	0.1 mg/m3	---
11/18/2022 10:53	5 ppm	0.0002	0.1 mg/m3	---
11/18/2022 10:54	5 ppm	0.0003	0.1 mg/m3	---
11/18/2022 10:55	5 ppm	0.0006	0.1 mg/m3	---
11/18/2022 10:56	5 ppm	0.0011	0.1 mg/m3	---
11/18/2022 10:57	5 ppm	0.0014	0.1 mg/m3	---
11/18/2022 10:58	5 ppm	0.0018	0.1 mg/m3	---
11/18/2022 10:59	5 ppm	0.0021	0.1 mg/m3	---
11/18/2022 11:00	5 ppm	0.0025	0.1 mg/m3	---
11/18/2022 11:01	5 ppm	0.0029	0.1 mg/m3	---
11/18/2022 11:02	5 ppm	0.0035	0.1 mg/m3	---
11/18/2022 11:03	5 ppm	0.0039	0.1 mg/m3	---
11/18/2022 11:04	5 ppm	0.0047	0.1 mg/m3	---
11/18/2022 11:05	5 ppm	0.0053	0.1 mg/m3	---
11/18/2022 11:06	5 ppm	0.0061	0.1 mg/m3	---
11/18/2022 11:07	5 ppm	0.0068	0.1 mg/m3	---
11/18/2022 11:08	5 ppm	0.0073	0.1 mg/m3	---
11/18/2022 11:09	5 ppm	0.0079	0.1 mg/m3	---
11/18/2022 11:10	5 ppm	0.0083	0.1 mg/m3	---
11/18/2022 11:11	5 ppm	0.0088	0.1 mg/m3	---
11/18/2022 11:12	5 ppm	0.0093	0.1 mg/m3	---
11/18/2022 11:13	5 ppm	0.0097	0.1 mg/m3	---
11/18/2022 11:14	5 ppm	0.0102	0.1 mg/m3	---
11/18/2022 11:15	5 ppm	0.0106	0.1 mg/m3	---
11/18/2022 11:16	5 ppm	0.0109	0.1 mg/m3	---
11/18/2022 11:17	5 ppm	0.0113	0.1 mg/m3	---
11/18/2022 11:18	5 ppm	0.0118	0.1 mg/m3	---
11/18/2022 11:19	5 ppm	0.0121	0.1 mg/m3	---
11/18/2022 11:20	5 ppm	0.0124	0.1 mg/m3	---
11/18/2022 11:21	5 ppm	0.0129	0.1 mg/m3	---
11/18/2022 11:22	5 ppm	0.0136	0.1 mg/m3	---
11/18/2022 11:23	5 ppm	0.0142	0.1 mg/m3	---
11/18/2022 11:24	5 ppm	0.015	0.1 mg/m3	---
11/18/2022 11:25	5 ppm	0.0158	0.1 mg/m3	---
11/18/2022 11:26	5 ppm	0.0162	0.1 mg/m3	---
11/18/2022 11:27	5 ppm	0.0169	0.1 mg/m3	---
11/18/2022 11:28	5 ppm	0.018	0.1 mg/m3	---
11/18/2022 11:29	5 ppm	0.0188	0.1 mg/m3	---
11/18/2022 11:30	5 ppm	0.0196	0.1 mg/m3	---
11/18/2022 11:31	5 ppm	0.0203	0.1 mg/m3	---
11/18/2022 11:32	5 ppm	0.0209	0.1 mg/m3	---
11/18/2022 11:33	5 ppm	0.0213	0.1 mg/m3	---
11/18/2022 11:34	5 ppm	0.0217	0.1 mg/m3	---
11/18/2022 11:35	5 ppm	0.0223	0.1 mg/m3	---
11/18/2022 11:36	5 ppm	0.0226	0.1 mg/m3	---
11/18/2022 11:37	5 ppm	0.0229	0.1 mg/m3	---
11/18/2022 11:38	5 ppm	0.0231	0.1 mg/m3	---
11/18/2022 11:39	5 ppm	0.0233	0.1 mg/m3	---
11/18/2022 11:40	5 ppm	0.0233	0.1 mg/m3	---
11/18/2022 11:41	5 ppm	0.0235	0.1 mg/m3	---
11/18/2022 11:42	5 ppm	0.0233	0.1 mg/m3	---
11/18/2022 11:43	5 ppm	0.0228	0.1 mg/m3	---
11/18/2022 11:44	5 ppm	0.0225	0.1 mg/m3	---
11/18/2022 11:45	5 ppm	0.0225	0.1 mg/m3	---
11/18/2022 11:46	5 ppm	0.0225	0.1 mg/m3	---
11/18/2022 11:47	5 ppm	0.0223	0.1 mg/m3	---
11/18/2022 11:48	5 ppm	0.0221	0.1 mg/m3	---
11/18/2022 11:49	5 ppm	0.0221	0.1 mg/m3	---
11/18/2022 11:50	5 ppm	0.0218	0.1 mg/m3	---

Notes

Units

Results provided in:

ppm (parts per million)

mg/m3 (milligrams per cubic meter)

Guidance Values

NYSDOH Generic Community Monitoring Plan

Miscellaneous Symbols & Acronyms

--- No data due to interrupted cellular service

Equipment used to obtain data:

Dust Trak II Air Monitor

C& A Job: 5447.0

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 2: Station 3 Dust Monitor - November 21, 2022 Data

Timestamp (America/New_York)	Guidance Value	VOC ppm AVG 15m (ppm)	Guidance Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/21/2022 8:06	5 ppm	---	0.1 mg/m3	---
11/21/2022 8:07	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:08	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:09	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 8:10	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:11	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:12	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:13	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:14	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:15	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:16	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:17	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:18	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:19	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:20	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:21	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:22	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:23	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:24	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:25	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:26	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:27	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:28	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:29	5 ppm	---	0.1 mg/m3	0.0044
11/21/2022 8:30	5 ppm	---	0.1 mg/m3	0.0045
11/21/2022 8:31	5 ppm	---	0.1 mg/m3	0.0045
11/21/2022 8:32	5 ppm	---	0.1 mg/m3	0.0045
11/21/2022 8:33	5 ppm	---	0.1 mg/m3	0.0045
11/21/2022 8:34	5 ppm	---	0.1 mg/m3	0.0044
11/21/2022 8:35	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:36	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:37	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:38	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:39	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:40	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:41	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:42	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:43	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:44	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 8:45	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:46	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:47	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 8:48	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 8:49	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 8:50	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 8:51	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 8:52	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 8:53	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 8:54	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 8:55	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 8:56	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 8:57	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 8:58	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 8:59	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:00	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:01	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:02	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:03	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:04	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:05	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:06	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:06	5 ppm	---	0.1 mg/m3	---
11/21/2022 9:08	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 9:09	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 9:10	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 9:11	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 9:12	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 9:13	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 9:14	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 9:15	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 9:16	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 9:17	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 9:18	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 9:19	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 9:20	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 9:21	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 9:22	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 9:23	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 9:24	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 9:25	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 9:26	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:27	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:28	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:29	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:30	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:31	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 9:32	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 9:33	5 ppm	---	0.1 mg/m3	0.0028
11/21/2022 9:34	5 ppm	---	0.1 mg/m3	0.0028
11/21/2022 9:35	5 ppm	---	0.1 mg/m3	0.0028
11/21/2022 9:36	5 ppm	---	0.1 mg/m3	0.0027
11/21/2022 9:37	5 ppm	---	0.1 mg/m3	0.0027
11/21/2022 9:38	5 ppm	---	0.1 mg/m3	0.0027
11/21/2022 9:39	5 ppm	---	0.1 mg/m3	0.0026
11/21/2022 9:40	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 9:41	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 9:42	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 9:43	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 9:44	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 9:45	5 ppm	---	0.1 mg/m3	0.0024
11/21/2022 9:46	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:47	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:48	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:49	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:50	5 ppm	---	0.1 mg/m3	0.0022
11/21/2022 9:51	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 9:52	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 9:53	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 9:54	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 9:55	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 9:56	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:57	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:58	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 9:59	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:00	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:01	5 ppm	---	0.1 mg/m3	0.0028
11/21/2022 10:02	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:03	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:04	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:05	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:06	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:07	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:08	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:09	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:10	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:11	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:12	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:13	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:14	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:15	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:16	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 10:17	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:18	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:19	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:20	5 ppm	---	0.1 mg/m3	0.0022
11/21/2022 10:21	5 ppm	---	0.1 mg/m3	0.0021
11/21/2022 10:22	5 ppm	---	0.1 mg/m3	0.0023
11/21/2022 10:23	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 10:24	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 10:25	5 ppm	---	0.1 mg/m3	0.0043
11/21/2022 10:26	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 10:27	5 ppm	---	0.1 mg/m3	0.005
11/21/2022 10:28	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 10:29	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 10:30	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 10:31	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 10:32	5 ppm	---	0.1 mg/m3	0.0052
11/21/2022 10:33	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 10:34	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 10:35	5 ppm	---	0.1 mg/m3	0.0054
11/21/2022 10:36	5 ppm	---	0.1 mg/m3	0.0055
11/21/2022 10:37	5 ppm	---	0.1 mg/m3	0.0054
11/21/2022 10:38	5 ppm	---	0.1 mg/m3	0.0041
11/21/2022 10:39	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 10:40	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 10:41	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:42	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:43	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 10:44	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:45	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:46	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 10:47	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:48	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:49	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:50	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:51	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:52	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:53	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:54	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:55	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:56	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:57	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:58	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 10:59	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:00	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:01	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 11:02	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:03	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:04	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 11:05	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:06	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:07	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 11:08	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:09	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:10	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:11	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:12	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 11:13	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 11:14	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 11:15	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 11:16	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 11:17	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:18	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:19	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:20	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:21	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:22	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 11:23	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 11:24	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 11:25	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 11:26	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 11:27	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:28	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:29	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 11:30	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 11:31	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:32	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:33	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 11:34	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:35	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 11:36	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:37	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 11:38	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 11:39	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:40	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:41	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:42	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:43	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 11:44	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:45	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:46	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:47	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:48	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:49	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 11:50	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 11:51	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:52	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 11:53	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 11:54	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 11:55	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 11:56	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 11:57	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 11:58	5 ppm	---	0.1 mg/m3	0.0027
11/21/2022 11:59	5 ppm	---	0.1 mg/m3	0.0027
11/21/2022 12:00	5 ppm	---	0.1 mg/m3	0.0026
11/21/2022 12:01	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:02	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:03	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:04	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:05	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:06	5 ppm	---	0.1 mg/m3	0.0022
11/21/2022 12:07	5 ppm	---	0.1 mg/m3	0.0022
11/21/2022 12:08	5 ppm	---	0.1 mg/m3	0.0022
11/21/2022 12:09	5 ppm	---	0.1 mg/m3	0.0025
11/21/2022 12:10	5 ppm	---	0.1 mg/m3	0.0026
11/21/2022 12:11	5 ppm	---	0.1 mg/m3	0.0026
11/21/2022 12:12	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 12:13	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:14	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 12:15	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 12:16	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 12:17	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 12:18	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:19	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:20	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 12:21	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 12:22	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 12:23	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 12:24	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 12:25	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 12:26	5 ppm	---	0.1 mg/m3	0.0032
11/21/2022 12:27	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:28	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 12:29	5 ppm	---	0.1 mg/m3	0.0029
11/21/2022 12:30	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:31	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 12:32	5 ppm	---	0.1 mg/m3	0.0031
11/21/2022 12:33	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:34	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:35	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:36	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:37	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:38	5 ppm	---	0.1 mg/m3	0.003
11/21/2022 12:39	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:40	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:41	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:42	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:43	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:44	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 12:45	5 ppm	---	0.1 mg/m3	0.004
11/21/2022 12:46	5 ppm	---	0.1 mg/m3	0.005
11/21/2022 12:47	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 12:48	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:49	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:50	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:51	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:52	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:53	5 ppm	---	0.1 mg/m3	0.0053
11/21/2022 12:54	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 12:55	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 12:56	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 12:57	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 12:58	5 ppm	---	0.1 mg/m3	0.0049
11/21/2022 12:59	5 ppm	---	0.1 mg/m3	0.0051
11/21/2022 13:00	5 ppm	---	0.1 mg/m3	0.0046
11/21/2022 13:01	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:02	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:03	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:04	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:05	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:06	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:07	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:08	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:09	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:10	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:11	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:12	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 13:13	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 13:14	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:15	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:16	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:17	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:18	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:19	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:20	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:21	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:22	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:23	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 13:24	5 ppm	---	0.1 mg/m3	0.0039
11/21/2022 13:25	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:26	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:27	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:28	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:29	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:30	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:31	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:32	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:33	5 ppm	---	0.1 mg/m3	0.0038
11/21/2022 13:34	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:35	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:36	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:37	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:38	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:39	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:40	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:41	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:42	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:43	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:44	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 13:45	5 ppm	---	0.1 mg/m3	0.0033
11/21/2022 13:46	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:47	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:48	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:49	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:50	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 13:51	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:52	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:53	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 13:54	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:55	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:56	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:57	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:58	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 13:59	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 14:00	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 14:01	5 ppm	---	0.1 mg/m3	0.0034
11/21/2022 14:02	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 14:03	5 ppm	---	0.1 mg/m3	0.0035
11/21/2022 14:04	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 14:05	5 ppm	---	0.1 mg/m3	0.0037
11/21/2022 14:06	5 ppm	---	0.1 mg/m3	0.0036
11/21/2022 14:07	5 ppm	---	0.1 mg/m3

Crawford & Associates Engineering, and Land Surveying, P.C.

Table 3: Station 1 Dust Monitor - November 22, 2022 Data

Timestamp (America/New_York)	Confidence Value	VOC ppm AVG 15m (ppm)	Confidence Value	Mass Conc. Total mg/m³ AVG 15m (mg/m³)
11/21/2022 7:56	5 ppm		0.1 mg/m3	
11/21/2022 7:57	5 ppm	0	0.1 mg/m3	
11/21/2022 7:58	5 ppm	0	0.1 mg/m3	0.055
11/21/2022 7:59	5 ppm	0	0.1 mg/m3	0.194
11/21/2022 8:00	5 ppm	0	0.1 mg/m3	0.136
11/21/2022 8:01	5 ppm	0	0.1 mg/m3	0.1058
11/21/2022 8:02	5 ppm	0	0.1 mg/m3	0.0878
11/21/2022 8:03	5 ppm	0	0.1 mg/m3	0.0757
11/21/2022 8:04	5 ppm	0	0.1 mg/m3	0.0669
11/21/2022 8:05	5 ppm	0	0.1 mg/m3	0.0603
11/21/2022 8:06	5 ppm	0	0.1 mg/m3	0.055
11/21/2022 8:07	5 ppm	0	0.1 mg/m3	0.0508
11/21/2022 8:08	5 ppm	0	0.1 mg/m3	0.0475
11/21/2022 8:09	5 ppm	0	0.1 mg/m3	0.0447
11/21/2022 8:10	5 ppm	0	0.1 mg/m3	0.0425
11/21/2022 8:11	5 ppm	0	0.1 mg/m3	0.0406
11/21/2022 8:12	5 ppm	0	0.1 mg/m3	0.0389
11/21/2022 8:13	5 ppm	0	0.1 mg/m3	0.039
11/21/2022 8:14	5 ppm	0	0.1 mg/m3	0.0153
11/21/2022 8:15	5 ppm	0	0.1 mg/m3	0.015
11/21/2022 8:16	5 ppm	0	0.1 mg/m3	0.0151
11/21/2022 8:17	5 ppm	0	0.1 mg/m3	0.0156
11/21/2022 8:18	5 ppm	0	0.1 mg/m3	0.0156
11/21/2022 8:19	5 ppm	0	0.1 mg/m3	0.0159
11/21/2022 8:20	5 ppm	0	0.1 mg/m3	0.0161
11/21/2022 8:21	5 ppm	0	0.1 mg/m3	0.0164
11/21/2022 8:22	5 ppm	0	0.1 mg/m3	0.0167
11/21/2022 8:23	5 ppm	0	0.1 mg/m3	0.0171
11/21/2022 8:24	5 ppm	0	0.1 mg/m3	0.0175
11/21/2022 8:25	5 ppm	0	0.1 mg/m3	0.0178
11/21/2022 8:26	5 ppm	0	0.1 mg/m3	0.0182
11/21/2022 8:27	5 ppm	0	0.1 mg/m3	0.0185
11/21/2022 8:28	5 ppm	0	0.1 mg/m3	0.0189
11/21/2022 8:29	5 ppm	0	0.1 mg/m3	0.0192
11/21/2022 8:30	5 ppm	0	0.1 mg/m3	0.0197
11/21/2022 8:31	5 ppm	0	0.1 mg/m3	0.0201
11/21/2022 8:32	5 ppm	0	0.1 mg/m3	0.0197
11/21/2022 8:33	5 ppm	0	0.1 mg/m3	0.0199
11/21/2022 8:34	5 ppm	0	0.1 mg/m3	0.0197
11/21/2022 8:35	5 ppm	0	0.1 mg/m3	0.0198
11/21/2022 8:36	5 ppm	0	0.1 mg/m3	0.0199
11/21/2022 8:37	5 ppm	0	0.1 mg/m3	0.02
11/21/2022 8:38	5 ppm	0	0.1 mg/m3	0.0199
11/21/2022 8:39	5 ppm	0	0.1 mg/m3	0.0198
11/21/2022 8:40	5 ppm	0	0.1 mg/m3	0.0198
11/21/2022 8:41	5 ppm	0	0.1 mg/m3	0.0198
11/21/2022 8:42	5 ppm	0	0.1 mg/m3	0.0199
11/21/2022 8:43	5 ppm	0	0.1 mg/m3	0.0199
11/21/2022 8:44	5 ppm	0	0.1 mg/m3	0.0194
11/21/2022 8:45	5 ppm	0	0.1 mg/m3	0.0187
11/21/2022 8:46	5 ppm	0	0.1 mg/m3	0.0182
11/21/2022 8:47	5 ppm	0	0.1 mg/m3	0.0177
11/21/2022 8:48	5 ppm	0	0.1 mg/m3	0.0174
11/21/2022 8:49	5 ppm	0	0.1 mg/m3	0.0171
11/21/2022 8:50	5 ppm	0	0.1 mg/m3	0.0166
11/21/2022 8:51	5 ppm	0	0.1 mg/m3	0.0161
11/21/2022 8:52	5 ppm	0	0.1 mg/m3	0.0155
11/21/2022 8:53	5 ppm	0	0.1 mg/m3	0.0149
11/21/2022 8:54	5 ppm	0	0.1 mg/m3	0.0145
11/21/2022 8:55	5 ppm	0	0.1 mg/m3	0.0137
11/21/2022 8:56	5 ppm	0	0.1 mg/m3	0.013
11/21/2022 8:57	5 ppm	0	0.1 mg/m3	0.0123
11/21/2022 8:58	5 ppm	0	0.1 mg/m3	0.0117
11/21/2022 8:59	5 ppm	0	0.1 mg/m3	0.0118
11/21/2022 9:00	5 ppm	0	0.1 mg/m3	0.0119
11/21/2022 9:01	5 ppm	0	0.1 mg/m3	0.0119
11/21/2022 9:02	5 ppm	0	0.1 mg/m3	0.0119
11/21/2022 9:03	5 ppm	0	0.1 mg/m3	0.0117
11/21/2022 9:04	5 ppm	0	0.1 mg/m3	0.0114
11/21/2022 9:05	5 ppm	0	0.1 mg/m3	0.0111
11/21/2022 9:06	5 ppm	0	0.1 mg/m3	0.0107
11/21/2022 9:07	5 ppm	0	0.1 mg/m3	0.0105
11/21/2022 9:08	5 ppm	0	0.1 mg/m3	0.0101
11/21/2022 9:09	5 ppm	0	0.1 mg/m3	0.0099
11/21/2022 9:10	5 ppm	0	0.1 mg/m3	0.0096
11/21/2022 9:11	5 ppm	0	0.1 mg/m3	0.0093
11/21/2022 9:12	5 ppm	0	0.1 mg/m3	0.009
11/21/2022 9:13	5 ppm	0	0.1 mg/m3	0.0085
11/21/2022 9:14	5 ppm	0	0.1 mg/m3	0.0079
11/21/2022 9:15	5 ppm	0	0.1 mg/m3	0.0072
11/21/2022 9:16	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 9:17	5 ppm	0	0.1 mg/m3	0.0064
11/21/2022 9:18	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:19	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:20	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:21	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:22	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:23	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:24	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:25	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:26	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:27	5 ppm	0	0.1 mg/m3	0.006
11/21/2022 9:28	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:29	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:30	5 ppm	0	0.1 mg/m3	0.0063
11/21/2022 9:31	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 9:32	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 9:33	5 ppm	0	0.1 mg/m3	0.0068
11/21/2022 9:34	5 ppm	0	0.1 mg/m3	0.0068
11/21/2022 9:35	5 ppm	0	0.1 mg/m3	0.0068
11/21/2022 9:36	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:37	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:38	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:39	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:40	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:41	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:42	5 ppm	0	0.1 mg/m3	0.007
11/21/2022 9:43	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:44	5 ppm	0	0.1 mg/m3	0.0069
11/21/2022 9:45	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 9:46	5 ppm	0	0.1 mg/m3	0.0064
11/21/2022 9:47	5 ppm	0	0.1 mg/m3	0.0062
11/21/2022 9:48	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:49	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:50	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:53	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:52	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:53	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:54	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:55	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:56	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 9:57	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 9:58	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 9:59	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 10:00	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 10:01	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 10:02	5 ppm	0	0.1 mg/m3	0.0059
11/21/2022 10:03	5 ppm	0	0.1 mg/m3	0.006
11/21/2022 10:04	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:05	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:06	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:07	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:08	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:09	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:10	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:11	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:12	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:13	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:14	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:15	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:16	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:17	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:18	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:19	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:20	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:21	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:22	5 ppm	0	0.1 mg/m3	0.0061
11/21/2022 10:23	5 ppm	0	0.1 mg/m3	0.0062
11/21/2022 10:24	5 ppm	0	0.1 mg/m3	0.0063
11/21/2022 10:25	5 ppm	0	0.1 mg/m3	0.0063
11/21/2022 10:26	5 ppm	0	0.1 mg/m3	0.0064
11/21/2022 10:27	5 ppm	0	0.1 mg/m3	0.0064
11/21/2022 10:28	5 ppm	0	0.1 mg/m3	0.0065
11/21/2022 10:29	5 ppm	0	0.1 mg/m3	0.0065
11/21/2022 10:30	5 ppm	0	0.1 mg/m3	0.0065
11/21/2022 10:31	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 10:32	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:33	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:34	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:35	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:36	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:37	5 ppm	0	0.1 mg/m3	0.0067
11/21/2022 10:38	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 10:39	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 10:40	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 10:41	5 ppm	0	0.1 mg/m3	0.0066
11/21/2022 10:42	5 ppm	0.0001	0.1 mg/m3	0.0067
11/21/2022 10:43	5 ppm	0.0002	0.1 mg/m3	0.0067
11/21/2022 10:44	5 ppm	0.0005	0.1 mg/m3	0.0067
11/21/2022 10:45	5 ppm	0.0007	0.1 mg/m3	0.0067
11/21/2022 10:46	5 ppm	0.0009	0.1 mg/m3	0.0067
11/21/2022 10:47	5 ppm	0.0013	0.1 mg/m3	0.0067
11/21/2022 10:48	5 ppm	0.0017	0.1 mg/m3	0.0068
11/21/2022 10:49	5 ppm	0.0022	0.1 mg/m3	0.0068
11/21/2022 10:50	5 ppm	0.0028	0.1 mg/m3	0.0067
11/21/2022 10:51	5 ppm	0.0033	0.1 mg/m3	0.0067
11/21/2022 10:52	5 ppm	0.0039	0.1 mg/m3	0.0068
11/21/2022 10:53	5 ppm	0.0045	0.1 mg/m3	0.0069
11/21/2022 10:54	5 ppm	0.0052	0.1 mg/m3	0.0068
11/21/2022 10:55	5 ppm	0.0062	0.1 mg/m3	0.0067
11/21/2022 10:56	5 ppm	0.0075	0.1 mg/m3	0.0067
11/21/2022 10:57	5 ppm	0.0087	0.1 mg/m3	0.0066
11/21/2022 10:58	5 ppm	0.0099	0.1 mg/m3	0.0065
11/21/2022 10:59	5 ppm	0.0111	0.1 mg/m3	0.0065
11/21/2022 11:00	5 ppm	0.0124	0.1 mg/m3	0.0064
11/21/2022 11:01	5 ppm	0.0139	0.1 mg/m3	0.0063
11/21/2022 11:02	5 ppm	0.0153	0.1 mg/m3	0.0062
11/21/2022 11:03	5 ppm	0.0169	0.1 mg/m3	0.0062
11/21/2022 11:04	5 ppm	0.0183	0.1 mg/m3	0.0062
11/21/2022 11:05	5 ppm	0.0197	0.1 mg/m3	0.0062
11/21/2022 11:06	5 ppm	0.021	0.1 mg/m3	0.0061
11/21/2022 11:07	5 ppm	0.0223	0.1 mg/m3	0.0061
11/21/2022 11:08	5 ppm	0.0239	0.1 mg/m3	0.006
11/21/2022 11:09	5 ppm	0.0253	0.1 mg/m3	0.006
11/21/2022 11:10	5 ppm	0.0265	0.1 mg/m3	0.006
11/21/2022 11:11	5 ppm	0.0275	0.1 mg/m3	0.0061
11/21/2022 11:12	5 ppm	0.0285	0.1 mg/m3	0.0061
11/21/2022 11:13	5 ppm	0.0296	0.1 mg/m3	0.0061
11/21/2022 11:14	5 ppm	0.0303	0.1 mg/m3	0.006
11/21/2022 11:15	5 ppm	0.0313	0.1 mg/m3	0.006
11/21/2022 11:16	5 ppm	0.0321	0.1 mg/m3	0.0061
11/21/2022 11:17	5 ppm	0.033	0.1 mg/m3	0.0061
11/21/2022 11:18	5 ppm	0.0335	0.1 mg/m3	0.0061
11/21/2022 11:19	5 ppm	0.034	0.1 mg/m3	0.0061
11/21/2022 11:20	5 ppm	0.0346	0.1 mg/m3	0.0061
11/21/2022 11:21	5 ppm	0.0352	0.1 mg/m3	0.0062
11/21/2022 11:22	5 ppm	0.0357	0.1 mg/m3	0.0063
11/21/2022 11:23	5 ppm	0.0361	0.1 mg/m3	0.0063
11/21/2022 11:24	5 ppm	0.0363	0.1 mg/m3	0.0063
11/21/2022 11:25	5 ppm	0.0365	0.1 mg/m3	0.0063
11/21/2022 11:26	5 ppm	0.0366	0.1 mg/m3	0.0063
11/21/2022 11:27	5 ppm	0.0369	0.1 mg/m3	0.0063
11/21/2022 11:28	5 ppm	0.0371	0.1 mg/m3	0.0063
11/21/2022 11:29	5 ppm	0.0373	0.1 mg/m3	0.0063
11/21/2022 11:30	5 ppm	0.0373	0.1 mg/m3	0.0063
11/21/2022 11:31	5 ppm	0.0373	0.1 mg/m3	0.0063
11/21/2022 11:32	5 ppm	0.0371	0.1 mg/m3	0.0063
11/21/2022 11:33	5 ppm	0.0373	0.1 mg/m3	0.0063
11/21/2022 11:34	5 ppm	0.0373	0.1 mg/m3	0.0063
11/21/2022 11:35	5 ppm	0.0376	0.1 mg/m3	0.0063
11/21/2022 11:36	5 ppm	0.0374	0.1 mg/m3	0.0061
11/21/2022 11:37	5 ppm	0.0377	0.1 mg/m3	0.0061
11/21/2022 11:38	5 ppm	0.0372	0.1 mg/m3	0.0061
11/21/2022 11:39	5 ppm	0.037	0.1 mg/m3	0.006
11/21/2022 11:40	5 ppm	0.0363	0.1 mg/m3	0.006
11/21/2022 11:41	5 ppm	0.0363	0.1 mg/m3	0.006
11/21/2022 11:42	5 ppm	0.0358	0.1 mg/m3	0.006
11/21/2022 11:43	5 ppm	0.036	0.1 mg/m3	0.006
11/21/2022 11:44	5 ppm	0.0357	0.1 mg/m3	0.0061
11/21/2022 11:45	5 ppm	0.0357	0.1 mg/m3	0.0061
11/21/2022 11:46	5 ppm	0.0354	0.1 mg/m3	0.0061
11/21/2022 11:47	5 ppm	0.0353	0.1 mg/m3	0.0061
11/21/2022 11:48	5 ppm	0.0351	0.1 mg/m3	0.0061
11/21/2022 11:49	5 ppm	0.0349	0.1 mg/m3	0.0061
11/21/2022 11:50	5 ppm	0.0351	0.1 mg/m3	0.0061
11/21/2022 11:51	5 ppm	0.035	0.1 mg/m3	0.0061
11/21/2022 11:52	5 ppm	0.0348	0.1 mg/m3	0.0061
11/21/2022 11:53	5 ppm	0.0352	0.1 mg/m3	0.0061
11/21/2022 11:54	5 ppm	0.0351	0.1 mg/m3	0.0061
11/21/2022 11:55	5 ppm	0.0354	0.1 mg/m3	0.0062
11/21/2022 11:56	5 ppm	0.0351	0.1 mg/m3	0.0063
11/21/2022 11:57	5 ppm	0.0349	0.1 mg/m3	0.0063
11/21/2022 11:58	5 ppm	0.0347	0.1 mg/m3	0.0063
11/21/2022 11:59	5 ppm	0.0342	0.1 mg/m3	0.0062
11/21/2022 12:00	5 ppm	0.0338	0.1 mg/m3	0.0062
11/21/2022 12:01	5 ppm	0.0336	0.1 mg/m3	0.0062
11/21/2022 12:02	5 ppm	0.033	0.1 mg/m3	0.0062
11/21/2022 12:03	5 ppm	0.0321	0.1 mg/m3	0.0061
11/21/2022 12:04	5 ppm	0.0313	0.1 mg/m3	0.0061
11/21/2022 12:05	5 ppm	0.0303	0.1 mg/m3	0.0061
11/21/2022 12:06	5 ppm	0.0297	0.1 mg/m3	0.0061
11/21/2022 12:07	5 ppm	0.0288	0.1 mg/m3	0.0061
11/21/2022 12:08	5 ppm	0.028	0.1 mg/m3	0.0061
11/21/2022 12:09	5 ppm	0.0274	0.1 mg/m3	0.0061
11/21/2022 12:10	5 ppm	0.027	0.1 mg/m3	0.006
11/21/2022 12:11	5 ppm	0.0264	0.1 mg/m3	0.0059
11/21/2022 12:12	5 ppm	0.0262	0.1 mg/m3	0.0059
11/21/2022 12:13	5 ppm	0.0251	0.1 mg/m3	0.0059
11/21/2022 12:14	5 ppm	0.0248	0.1 mg/m3	0.0059
11/21/2022 12:15	5 ppm	0.0246	0.1 mg/m3	0.0059
11/21/2022 12:16	5 ppm	0.024	0.1 mg/m3	0.0059
11/21/2022 12:17	5 ppm	0.0238	0.1 mg/m3	0.0058
11/21/2022 12:18	5 ppm	0.024	0.1 mg/m3	0.0058
11/21/2022 12:19	5 ppm	0.0243	0.1 mg/m3	0.0059
11/21/2022 12:20	5 ppm	0.0244	0.1 mg/m3	0.0058
11/21/2022 12:21	5 ppm	0.0243	0.1 mg/m3	0.0058
11/21/2022 12:22	5 ppm	0.0242	0.1 mg/m3	0.0058
11/21/2022 12:23	5 ppm	0.0241	0.1 mg/m3	0.0058
11/21/2022 12:24	5 ppm	0.0241	0.1 mg/m3	0.0057
11/21/2022 12:25	5 ppm	0.0241	0.1 mg/m3	0.0057
11/21/2022 12:26	5 ppm	0.0239	0.1 mg/m3	0.0057
11/21/2022 12:27	5 ppm	0.0237	0.1 mg/m3	0.0057
11/21/2022 12:28	5 ppm	0.0233	0.1 mg/m3	0.0057
11/21/2022 12:29	5 ppm	0.0229	0.1 mg/m3	0.0057
11/21/2022 12:30	5 ppm	0.0225	0.1 mg/m3	0.0057
11/21/2022 12:31	5 ppm	0.0222	0.1 mg/m3	0.0057
11/21/2022 12:32	5 ppm	0.0218	0.1 mg/m3	0.0057
11/21/2022 12:33	5 ppm	0.0213	0.1 mg/m3	0.0057
11/21/2022 12:34	5 ppm	0.0207	0.1 mg/m3	0.0057
11/21/2022 12:35	5 ppm	0.0201	0.1 mg/m3	0.0058
11/21/2022 12:36	5 ppm	0.0193	0.1 mg/m3	0.0057
11/21/2022 12:37	5 ppm	0.0189	0.1 mg/m3	0.0057
11/21/2022 12:38	5 ppm	0.0186	0.1 mg/m3	0.0056
11/21/2022 12:39	5 ppm	0.0178	0.1 mg/m3	0.0055
11/21/2022 12:40	5 ppm	0.0169	0.1 mg/m3	0.0053
11/21/2022 12:41	5 ppm	0.0165	0.1 mg/m3	0.0055
11/21/2022 12:42	5 ppm	0.0161	0.1 mg/m3	0.0054
11/21/2022 12:43	5 ppm	0.016	0.1 mg/m3	0.0053
11/21/2022 12:44	5 ppm	0.0161	0.1 mg/m3	0.0052
11/21/2022 12:45	5 ppm	0.0157	0.1 mg/m3	0.0051
11/21/2022 12:46	5 ppm	0.0153	0.1 mg/m3	0.0049
11/21/2022 12:47	5 ppm	0.0148	0.1 mg/m3	0.0049
11/21/2022 12:48	5 ppm	0.0146	0.1 mg/m3	0.0048
11/21/2022 12:49	5 ppm	0.0141	0.1 mg/m3	0.0047
11/21/2022 12:50	5 ppm	0.0137	0.1 mg/m3	0.0045
11/21/2022 12:51	5 ppm	0.0135	0.1 mg/m3	0.0045
11/21/2022 12:52	5 ppm	0.0133	0.1 mg/m3	0.0045
11/21/2022 12:53	5 ppm	0.0131	0.1 mg/m3	0.0045
11/21/2022 12:54	5 ppm	0.0136	0.1 mg/m3	0.0045
11/21/2022 12:55	5 ppm	0.0139	0.1 mg/m3	0.0045
11/21/2022 12:56	5 ppm	0.0139	0.1 mg/m3	0.0045
11/21/2022 12:57	5 ppm	0.0138	0.1 mg/m3	0.0045
11/21/2022 12:58	5 ppm	0.0135	0.1 mg/m3	0.0045
11/21/2022 12:59	5 ppm	0.0133	0.1 mg/m3	0.0045
11/21/2022 13:00	5 ppm	0.0131	0.1 mg/m3	0.0046
11/21/2022 13:01	5 ppm	0.0132	0.1 mg/m3	0.0046
11/21/2022 13:02	5 ppm	0.0132	0.1 mg/m3	0.0046
11/21/2022 13:03	5 ppm	0.0132	0.1 mg/m3	0.0046
11/21/2022 13:04	5 ppm	0.0134	0.1 mg/m3	0.0046
11/21/2022 13:05	5 ppm	0.0135	0.1 mg/m3	0.0046
11/21/2022 13:06	5 ppm	0.0135	0.1 mg/m3	0.0045
11/21/2022 13:07	5 ppm	0.0136	0.1 mg/m3	0.0045
11/21/2022 13:08	5 ppm	0.0135	0.1 mg/m3	0.0045
11/21/2022 13:09	5 ppm	0.0133	0.1 mg/m3	0.0044
11/21/2022 13:10	5 ppm	0.0133	0.1 mg/m3	0.0043
11/21/2022 13:11	5 ppm	0.0131	0.1 mg/m3	0.0043
11/21/2022 13:12	5 ppm	0.0131	0.1 mg/m3	0.0044
11/21/2022 13:13	5 ppm	0.0133	0.1 mg/m3	0.0045
11/21/2022 13:14	5 ppm	0.0133	0.1 mg/m3	0.0045
11/21/2022 13:15	5 ppm	0.0134	0.1 mg/m3	0.0045
11/21/2022 13:16	5 ppm	0.0134	0.1 mg/m3	0.0045
11/21/2022 13:17	5 ppm	0.0133	0.1 mg/m3	0.0046
11/21/2022 13:18	5 ppm	0.0132	0.1 mg/m3	0.0047
11/21/2022 13:19	5 ppm	0.0128	0.1 mg/m3	0.0047
11/21/2022 13:20	5 ppm	0.0128	0.1 mg/m3	0.0047
11/21/2022 13:21	5 ppm	0.0127	0.1 mg/m3	0.0047
11/21/2022 13:22	5 ppm	0.0124	0.1 mg/m3	0.0047
11/21/2022 13:23	5 ppm	0.0122	0.1 mg/m3	0.0047
11/21/2022 13:24	5 ppm	0.0118	0.1 mg/m3	0.0047
11/21/2022 13:25	5 ppm	0.0118	0.1 mg/m3	0.0047
11/21/2022 13:26	5 ppm	0.012	0.1 mg/m3	0.0047
11/21/2022 13:27	5 ppm	0.0119	0.1 mg/m3	0.0045
11/21/2022 13:28	5 ppm	0.0119	0.1 mg/m3	0.0044
11/21/2022 13:29	5 ppm	0.0118	0.1 mg/m3	0.0043
11/21/2022 13:30	5 ppm	0.0117	0.1 mg/m3	0.0043
11/21/2022 13:31	5 ppm	0.0117	0.1 mg/m3	0.0042
11/21/2022 13:32	5 ppm	0.0119	0.1 mg/m3	0.0041
11/21/2022 13:33	5 ppm	0.0119	0.1 mg/m3	0.0041
11/21/2022 13:34	5 ppm	0.0121	0.1 mg/m3	0.004
11/21/2022 13:35	5 ppm	0.0119	0.1 mg/m3	0.004
11/21/2022 13:36	5 ppm	0.012	0.1 mg/m3	0.004
11/21/2022 13:37	5 ppm	0.0122	0.1 mg/m3	0

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Nr.	Name	Start	Finish	Duration	Predecessors	Resource Names	Work	Baseline Start	Baseline Finish	Baseline Duration	Baseline Work	Actual Start	Actual Finish	Actual Duration	Actual Work	Remaining Duration	Remaining Work	Percent Complete	Percent Work Complete
1	Construction Engineering Plan	01.01.2020 08:00	31.12.2020 17:00	261 days			2088 hrs	01.01.2020 08:00	31.12.2020 17:00	261 days	2088 hrs	01.01.2020 08:00	31.12.2020 17:00	261 days	2088 hrs	0 days	0 hrs	100%	100%
2	Introduction to the Project	01.01.2020 08:00	01.01.2020 17:00	1 day		Project Manager	8 hrs	01.01.2020 08:00	01.01.2020 17:00	1 day	8 hrs	01.01.2020 08:00	01.01.2020 17:00	1 day	8 hrs	0 days	0 hrs	100%	100%
3	Project Kick-off Meeting	01.01.2020 08:00	01.01.2020 17:00	1 day		Project Manager,Team	8 hrs	01.01.2020 08:00	01.01.2020 17:00	1 day	8 hrs	01.01.2020 08:00	01.01.2020 17:00	1 day	8 hrs	0 days	0 hrs	100%	100%
4	Site Preparation	02.01.2020 08:00	15.01.2020 17:00	10 days			80 hrs	02.01.2020 08:00	15.01.2020 17:00	10 days	80 hrs	02.01.2020 08:00	15.01.2020 17:00	10 days	80 hrs	0 days	0 hrs	100%	100%
5	Clearing and Grubbing	02.01.2020 08:00	03.01.2020 17:00	2 days		Excavator,Operator	16 hrs	02.01.2020 08:00	03.01.2020 17:00	2 days	16 hrs	02.01.2020 08:00	03.01.2020 17:00	2 days	16 hrs	0 days	0 hrs	100%	100%
6	Demolition of Existing Structures	04.01.2020 08:00	06.01.2020 17:00	3 days	5	Excavator,Operator,Truck	24 hrs	04.01.2020 08:00	06.01.2020 17:00	3 days	24 hrs	04.01.2020 08:00	06.01.2020 17:00	3 days	24 hrs	0 days	0 hrs	100%	100%
7	Grading and Leveling	07.01.2020 08:00	10.01.2020 17:00	4 days	6	Excavator,Operator,Surveyor	32 hrs	07.01.2020 08:00	10.01.2020 17:00	4 days	32 hrs	07.01.2020 08:00	10.01.2020 17:00	4 days	32 hrs	0 days	0 hrs	100%	100%
8	Utility Relocation	11.01.2020 08:00	15.01.2020 17:00	5 days	7	Utility Crew,Truck	40 hrs	11.01.2020 08:00	15.01.2020 17:00	5 days	40 hrs	11.01.2020 08:00	15.01.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
9	Foundation Work	16.01.2020 08:00	31.01.2020 17:00	12 days	4		96 hrs	16.01.2020 08:00	31.01.2020 17:00	12 days	96 hrs	16.01.2020 08:00	31.01.2020 17:00	12 days	96 hrs	0 days	0 hrs	100%	100%
10	Excavation for Foundations	16.01.2020 08:00	17.01.2020 17:00	2 days	8	Excavator,Operator	16 hrs	16.01.2020 08:00	17.01.2020 17:00	2 days	16 hrs	16.01.2020 08:00	17.01.2020 17:00	2 days	16 hrs	0 days	0 hrs	100%	100%
11	Pouring Concrete Footings	18.01.2020 08:00	20.01.2020 17:00	3 days	10	Concrete Crew,Truck	24 hrs	18.01.2020 08:00	20.01.2020 17:00	3 days	24 hrs	18.01.2020 08:00	20.01.2020 17:00	3 days	24 hrs	0 days	0 hrs	100%	100%
12	Foundation Walls	21.01.2020 08:00	25.01.2020 17:00	5 days	11	Concrete Crew,Mason	40 hrs	21.01.2020 08:00	25.01.2020 17:00	5 days	40 hrs	21.01.2020 08:00	25.01.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
13	Waterproofing	26.01.2020 08:00	31.01.2020 17:00	6 days	12	Mason,Laborer	48 hrs	26.01.2020 08:00	31.01.2020 17:00	6 days	48 hrs	26.01.2020 08:00	31.01.2020 17:00	6 days	48 hrs	0 days	0 hrs	100%	100%
14	Structural Steel	01.02.2020 08:00	15.02.2020 17:00	11 days	9		88 hrs	01.02.2020 08:00	15.02.2020 17:00	11 days	88 hrs	01.02.2020 08:00	15.02.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
15	Steel Fabrication	01.02.2020 08:00	05.02.2020 17:00	5 days	13	Fabrication Crew	40 hrs	01.02.2020 08:00	05.02.2020 17:00	5 days	40 hrs	01.02.2020 08:00	05.02.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
16	Steel Erection	06.02.2020 08:00	15.02.2020 17:00	8 days	15	Crane,Operator,Ironworker	64 hrs	06.02.2020 08:00	15.02.2020 17:00	8 days	64 hrs	06.02.2020 08:00	15.02.2020 17:00	8 days	64 hrs	0 days	0 hrs	100%	100%
17	Concrete Work	16.02.2020 08:00	29.02.2020 17:00	10 days	14		80 hrs	16.02.2020 08:00	29.02.2020 17:00	10 days	80 hrs	16.02.2020 08:00	29.02.2020 17:00	10 days	80 hrs	0 days	0 hrs	100%	100%
18	Slab on Grade	16.02.2020 08:00	20.02.2020 17:00	5 days	16	Concrete Crew,Finisher	40 hrs	16.02.2020 08:00	20.02.2020 17:00	5 days	40 hrs	16.02.2020 08:00	20.02.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
19	Elevated Slabs	21.02.2020 08:00	29.02.2020 17:00	7 days	18	Concrete Crew,Finisher,Pump	56 hrs	21.02.2020 08:00	29.02.2020 17:00	7 days	56 hrs	21.02.2020 08:00	29.02.2020 17:00	7 days	56 hrs	0 days	0 hrs	100%	100%
20	Masonry	01.03.2020 08:00	15.03.2020 17:00	11 days	17		88 hrs	01.03.2020 08:00	15.03.2020 17:00	11 days	88 hrs	01.03.2020 08:00	15.03.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
21	Exterior Walls	01.03.2020 08:00	10.03.2020 17:00	8 days	19	Mason,Laborer	64 hrs	01.03.2020 08:00	10.03.2020 17:00	8 days	64 hrs	01.03.2020 08:00	10.03.2020 17:00	8 days	64 hrs	0 days	0 hrs	100%	100%
22	Interior Walls	11.03.2020 08:00	15.03.2020 17:00	5 days	21	Mason,Laborer	40 hrs	11.03.2020 08:00	15.03.2020 17:00	5 days	40 hrs	11.03.2020 08:00	15.03.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
23	Roofing	16.03.2020 08:00	31.03.2020 17:00	12 days	20		96 hrs	16.03.2020 08:00	31.03.2020 17:00	12 days	96 hrs	16.03.2020 08:00	31.03.2020 17:00	12 days	96 hrs	0 days	0 hrs	100%	100%
24	Roof Framing	16.03.2020 08:00	20.03.2020 17:00	5 days	22	Carpenter,Laborer	40 hrs	16.03.2020 08:00	20.03.2020 17:00	5 days	40 hrs	16.03.2020 08:00	20.03.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
25	Roof Covering	21.03.2020 08:00	31.03.2020 17:00	9 days	24	Roofer,Laborer	72 hrs	21.03.2020 08:00	31.03.2020 17:00	9 days	72 hrs	21.03.2020 08:00	31.03.2020 17:00	9 days	72 hrs	0 days	0 hrs	100%	100%
26	Mechanical Systems	01.04.2020 08:00	15.04.2020 17:00	11 days	23		88 hrs	01.04.2020 08:00	15.04.2020 17:00	11 days	88 hrs	01.04.2020 08:00	15.04.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
27	HVAC Installation	01.04.2020 08:00	10.04.2020 17:00	8 days	25	HVAC Technician	64 hrs	01.04.2020 08:00	10.04.2020 17:00	8 days	64 hrs	01.04.2020 08:00	10.04.2020 17:00	8 days	64 hrs	0 days	0 hrs	100%	100%
28	Plumbing	11.04.2020 08:00	15.04.2020 17:00	5 days	27	Plumber,Laborer	40 hrs	11.04.2020 08:00	15.04.2020 17:00	5 days	40 hrs	11.04.2020 08:00	15.04.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
29	Electrical Systems	16.04.2020 08:00	30.04.2020 17:00	11 days	26		88 hrs	16.04.2020 08:00	30.04.2020 17:00	11 days	88 hrs	16.04.2020 08:00	30.04.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
30	Electrical Rough-In	16.04.2020 08:00	22.04.2020 17:00	7 days	28	Electrician,Laborer	56 hrs	16.04.2020 08:00	22.04.2020 17:00	7 days	56 hrs	16.04.2020 08:00	22.04.2020 17:00	7 days	56 hrs	0 days	0 hrs	100%	100%
31	Electrical Finishing	23.04.2020 08:00	30.04.2020 17:00	6 days	30	Electrician	48 hrs	23.04.2020 08:00	30.04.2020 17:00	6 days	48 hrs	23.04.2020 08:00	30.04.2020 17:00	6 days	48 hrs	0 days	0 hrs	100%	100%
32	Interior Finishes	01.05.2020 08:00	15.05.2020 17:00	11 days	29		88 hrs	01.05.2020 08:00	15.05.2020 17:00	11 days	88 hrs	01.05.2020 08:00	15.05.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
33	Drywall	01.05.2020 08:00	08.05.2020 17:00	6 days	31	Drywall Crew	48 hrs	01.05.2020 08:00	08.05.2020 17:00	6 days	48 hrs	01.05.2020 08:00	08.05.2020 17:00	6 days	48 hrs	0 days	0 hrs	100%	100%
34	Painting	09.05.2020 08:00	15.05.2020 17:00	5 days	33	Painter	40 hrs	09.05.2020 08:00	15.05.2020 17:00	5 days	40 hrs	09.05.2020 08:00	15.05.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
35	Flooring	16.05.2020 08:00	31.05.2020 17:00	12 days	32		96 hrs	16.05.2020 08:00	31.05.2020 17:00	12 days	96 hrs	16.05.2020 08:00	31.05.2020 17:00	12 days	96 hrs	0 days	0 hrs	100%	100%
36	Tile Installation	16.05.2020 08:00	22.05.2020 17:00	7 days	34	Tile Setter	56 hrs	16.05.2020 08:00	22.05.2020 17:00	7 days	56 hrs	16.05.2020 08:00	22.05.2020 17:00	7 days	56 hrs	0 days	0 hrs	100%	100%
37	Carpet Installation	23.05.2020 08:00	31.05.2020 17:00	7 days	36	Carpet Installer	56 hrs	23.05.2020 08:00	31.05.2020 17:00	7 days	56 hrs	23.05.2020 08:00	31.05.2020 17:00	7 days	56 hrs	0 days	0 hrs	100%	100%
38	Exterior Finishes	01.06.2020 08:00	15.06.2020 17:00	11 days	35		88 hrs	01.06.2020 08:00	15.06.2020 17:00	11 days	88 hrs	01.06.2020 08:00	15.06.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
39	Siding	01.06.2020 08:00	10.06.2020 17:00	8 days	37	Siding Crew	64 hrs	01.06.2020 08:00	10.06.2020 17:00	8 days	64 hrs	01.06.2020 08:00	10.06.2020 17:00	8 days	64 hrs	0 days	0 hrs	100%	100%
40	Exterior Painting	11.06.2020 08:00	15.06.2020 17:00	5 days	39	Painter	40 hrs	11.06.2020 08:00	15.06.2020 17:00	5 days	40 hrs	11.06.2020 08:00	15.06.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
41	Landscaping	16.06.2020 08:00	30.06.2020 17:00	11 days	38		88 hrs	16.06.2020 08:00	30.06.2020 17:00	11 days	88 hrs	16.06.2020 08:00	30.06.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
42	Grading	16.06.2020 08:00	18.06.2020 17:00	3 days	40	Excavator,Operator	24 hrs	16.06.2020 08:00	18.06.2020 17:00	3 days	24 hrs	16.06.2020 08:00	18.06.2020 17:00	3 days	24 hrs	0 days	0 hrs	100%	100%
43	Planting	19.06.2020 08:00	25.06.2020 17:00	5 days	42	Landscaper	40 hrs	19.06.2020 08:00	25.06.2020 17:00	5 days	40 hrs	19.06.2020 08:00	25.06.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
44	Irrigation System	26.06.2020 08:00	30.06.2020 17:00	5 days	43	Irrigation Specialist	40 hrs	26.06.2020 08:00	30.06.2020 17:00	5 days	40 hrs	26.06.2020 08:00	30.06.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
45	Paving and Concrete	01.07.2020 08:00	15.07.2020 17:00	11 days	41		88 hrs	01.07.2020 08:00	15.07.2020 17:00	11 days	88 hrs	01.07.2020 08:00	15.07.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
46	Asphalt Paving	01.07.2020 08:00	08.07.2020 17:00	6 days	44	Paving Crew	48 hrs	01.07.2020 08:00	08.07.2020 17:00	6 days	48 hrs	01.07.2020 08:00	08.07.2020 17:00	6 days	48 hrs	0 days	0 hrs	100%	100%
47	Concrete Sidewalks	09.07.2020 08:00	15.07.2020 17:00	5 days	46	Concrete Crew	40 hrs	09.07.2020 08:00	15.07.2020 17:00	5 days	40 hrs	09.07.2020 08:00	15.07.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
48	Site Amenities	16.07.2020 08:00	31.07.2020 17:00	12 days	45		96 hrs	16.07.2020 08:00	31.07.2020 17:00	12 days	96 hrs	16.07.2020 08:00	31.07.2020 17:00	12 days	96 hrs	0 days	0 hrs	100%	100%
49	Fencing	16.07.2020 08:00	20.07.2020 17:00	5 days	47	Fencing Crew	40 hrs	16.07.2020 08:00	20.07.2020 17:00	5 days	40 hrs	16.07.2020 08:00	20.07.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
50	Signage	21.07.2020 08:00	25.07.2020 17:00	5 days	49	Sign Installer	40 hrs	21.07.2020 08:00	25.07.2020 17:00	5 days	40 hrs	21.07.2020 08:00	25.07.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
51	Lighting	26.07.2020 08:00	31.07.2020 17:00	6 days	50	Electrician	48 hrs	26.07.2020 08:00	31.07.2020 17:00	6 days	48 hrs	26.07.2020 08:00	31.07.2020 17:00	6 days	48 hrs	0 days	0 hrs	100%	100%
52	Testing and Commissioning	01.08.2020 08:00	15.08.2020 17:00	11 days	48		88 hrs	01.08.2020 08:00	15.08.2020 17:00	11 days	88 hrs	01.08.2020 08:00	15.08.2020 17:00	11 days	88 hrs	0 days	0 hrs	100%	100%
53	Mechanical Testing	01.08.2020 08:00	05.08.2020 17:00	5 days	51	Technician	40 hrs	01.08.2020 08:00	05.08.2020 17:00	5 days	40 hrs	01.08.2020 08:00	05.08.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
54	Electrical Testing	06.08.2020 08:00	10.08.2020 17:00	5 days	53	Electrician	40 hrs	06.08.2020 08:00	10.08.2020 17:00	5 days	40 hrs	06.08.2020 08:00	10.08.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
55	Commissioning	11.08.2020 08:00	15.08.2020 17:00	5 days	54	Commissioning Agent	40 hrs	11.08.2020 08:00	15.08.2020 17:00	5 days	40 hrs	11.08.2020 08:00	15.08.2020 17:00	5 days	40 hrs	0 days	0 hrs	100%	100%
56	Final Inspections and Handover	16.08.2020 08:00	31.08.2020 17:00	12 days	52		96 hrs	16.08.2020 08:00	31.08.2020 17:00	12 days	96 hrs	16.08.2020 08:00	31.08.2020 17:00	12 days	96 hrs	0 days	0 hrs	100%	100%
57	Punch List Creation	16.08.2020 08:00	18.08.2020 17:00	3 days	55	Project Manager,Team	24 hrs	16.08.2020 08:00	18.08.2020 17:00	3 days	24 hrs	16.08.2020 08:00	18.08.2020 17:00	3 days	24 hrs	0 days	0 hrs	100%	100%
58	Final Inspection	19.08.2020 08:00	20.08.2020 17:00	2 days	57	Inspector	16 hrs	19.08.2020 08:00	20.08.2020 17:00	2 days	16 hrs	19.08.2020 08:00	20.08.2020 17:00	2 days	16 hrs	0 days	0 hrs	100%	100%
59	Handover to Client	21.08.2020 08:00	31.08.2020 17:00	9 days	58	Project Manager	72 hrs	21.08.2020 08:00	31.08.2020 17:00	9 days	72 hrs	21.08.2020 08:00	31.08.2020 17:00	9 days	72 hrs	0 days	0 hrs	100%	100%

Date
Date: 31.12.2020 17:00

Milestones
Milestone
Milestone: Groundbreaking Ceremony (Start of Construction)
Milestone: Topping Out Ceremony & Completion
Milestone: Grand Opening & Ribbon Cutting Ceremony

Summary and Critical Tasks
Summary: Summary Task
Critical: Critical Task

APPENDIX D

Site Photographs

AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 1	Date: 07/22/25

Direction Photo Taken:

Facing southwest.

Description:

Leachate Collection System area near the Site entrance along Collier Road, in the northern portion of the Site.



Photo No. 2	Date: 07/22/25

Direction Photo Taken:

Facing north.

Description:

Area of the existing 10,000 gallon underground leachate tank, in the north/northwestern portion of the Site.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 3	Date: 07/22/25

Direction Photo Taken:

Facing south.

Description:

Manholes of the two existing 2,0000 gallon leachate tanks, in the north/northwestern portion of the Site.



Photo No. 4	Date: 07/22/25

Direction Photo Taken:

Facing north.

Description:

Pump and collection area within the surface leachate collection area (are not visible due to the presence of phragmites), in the northwestern portion of the Site.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 5	Date: 07/22/25

Direction Photo Taken:

Facing west.

Description:

Off-site pond, northwest of the existing surface leachate collection area, in the northwestern portion of the Site.



Photo No. 6	Date: 07/22/25

Direction Photo Taken:

Facing southwest.

Description:

On-site riverine wetland/drainage swale near the discharge location of a catch basin in the southwestern portion of the Site with significant turbidity and a brownish to reddish hue.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 7	Date: 07/22/25

Direction Photo Taken:

Facing west.

Description:

Gravel with red coloring observed near the leachate control area, east of the landfill access road, in the northern portion of the Site.



Photo No. 8	Date: 07/22/25

Direction Photo Taken:

Facing south.

Description:

Erosion control channel in the southwestern portion of the landfill, in the western portion of the Site. Monitoring wells 6A and 6B (typical) staked with metal poles and yellow tags in the foreground (right).



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 9	Date: 07/22/25

Direction Photo Taken:

Facing east.

Description:

Town Recycling Center structures visible from the landfill access road, in the southeastern portion of the Site.



Photo No. 10	Date: 07/22/25

Direction Photo Taken:

Facing south.

Description:

Southeastern portion of the landfill with several soil gas vent pipes associated with the landfill underground venting trench.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Town of Hurley Landfill	1043 Dug Hill Road, Hurley NY	60762183

Photo No. 11	Date: 07/22/25

Direction Photo Taken:

Facing north.

Description:

Landfill access road and landfill in the eastern portion of the Site.



Photo No. 12	Date: 07/22/25

Direction Photo Taken:

Facing northwest.

Description:

Vegetated landfill cover (typical) from highest point in the landfill.



APPENDIX E

PFAS Sampling Supporting Documents

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023



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ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

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

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

2023 ADDENDUM TO JUNE 1998 DIVISON OF WATER TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) NO. 1.1.1 (Originator – Alexander Smith)

TABLE 1
NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES
February 2023

SUBSTANCE (CAS No.)	WATER CLASSES	STANDARD (µg/L)	GUIDANCE VALUE (µg/L)	TYPE	BASIS CODE
1,4-Dioxane (123-91-1)	A, A-S, AA, AA-S		0.35	H(WS)	A
	GA		0.35	H(WS)	A
	GSA		0.35	H(WS)	A
	A, A-S, AA, AA-S, B, C		18,000	A(C)	
	A, A-S, AA, AA-S, B, C, D		160,000	A(A)	
	SA, SB, SC, I		7,000	A(C)	
	SA, SB, SC, I, SD		63,000	A(A)	
Perfluorooctane Sulfonic Acid (PFOS) (1763-23-1)	A, A-S, AA, AA-S		0.0027	H(WS)	A
	GA		0.0027	H(WS)	A
	GSA		0.0027	H(WS)	A
	A, A-S, AA, AA-S, B, C		160	A(C)	
	A, A-S, AA, AA-S, B, C, D		710	A(A)	
	SA, SB, SC, I		41	A(C)	
	SA, SB, SC, I, SD		190	A(A)	
Perfluorooctanoic acid (PFOA) (335-67-1)	A, A-S, AA, AA-S		0.0067	H(WS)	A
	GA		0.0067	H(WS)	A
	GSA		0.0067	H(WS)	A

TABLE 5
NEW YORK STATE GROUNDWATER EFFLUENT LIMITATIONS (CLASS GA)
February 2023

SUBSTANCE (CAS No.)	MAXIMUM ALLOWABLE CONCENTRATION (µg/L)	CATEGORY
1,4-Dioxane (123-91-1)	0.35	B
Perfluorooctane Sulfonic Acid (PFOS) (1763-23-1)	0.0027	B
Perfluorooctanoic acid (PFOA) (335-67-1)	0.0067	B

Carol Lamb-Lafay, P.E., Director
Division of Water

United States Environmental Protection Agency

Office of Water

www.epa.gov December 2024

Method 1633, Revision A

Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS

U.S. Environmental Protection Agency
Office of Water (4303T)
Office of Science and Technology
Engineering and Analysis Division
1200 Pennsylvania Avenue, NW
Washington, DC 20460

EPA 820-R-24-007

Method 1633A
Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS

December 2024

Notice

Method 1633A for the analysis of PFAS was developed by the EPA Office of Water, Engineering and Analysis Division (EAD), in collaboration with the Department of Defense (DoD).

EPA issuing this method does not require its use for Clean Water Act compliance monitoring at the Federal level; that will only occur after it has been proposed and promulgated through rulemaking (e.g., added to 40 CFR Part 136). However, EPA recommends the use of this method, and it is currently the only PFAS method that has been validated in multiple laboratories for aqueous matrices that include wastewater, surface water, groundwater, and landfill leachate, as well as for soil, sediment, biosolids, and fish and shellfish tissue.

This December 2024 version of the method is identified as Method 1633A and it supersedes all previous versions, addresses various minor editorial issues noted in the January 2024 version, as well as clarifying several technical concerns (see the version history below).

Version History

August 2021	The first draft of Method 1633 was released
April 2022	The second draft of Method 1633 was released
December 2022	The third draft of Method 1633 was released
July 2023	The fourth draft of Method 1633 was released
January 2024	The "not-draft" version of Method 1633 was released
March 2024	The Errata Sheet was issued to address minor editorial errors in the January 2024 version and provide a few technical clarifications
December 2024	Method 1633A was released and addresses the items in the Errata Sheet and recent comments, as described below.

Section	Change
Cover, Title page, and footer	Update the method number to 1633A.
Notice	Update to reflect the new method number and to explain that this version addresses the issues in the earlier errata sheet.
1.6	Add text to indicate that laboratories may add other PFAS as target analytes if authentic standards become available without the need for prior approval form the EPA.
8.2.1 Note and 11.0	Correct the references to the determination of "percent solids" in aqueous samples to "total suspended solids."
8.5	Add an introductory paragraph to Section 8.5, revise subsections 8.5.1 to 8.5.5, and add a new holding time summary as 8.5.6.
9.2.1.3	Revise the end of the section to clarify that there are no IPR-specific limits for the mean EIS recoveries or RSD for the IPR aliquots, and point to the limits in Tables 6 and 8.
10.1.1, 10.3.3.2, 14.3.5, Note below 14.3.5, and 15.2	Correct the callouts to Table 9 to refer to Table 10.
10.1.7	Revise the text of Section 10.1.7 to clarify the misconception that the frequency of the mass calibration verification is *not* with every analysis batch, *and* delete the two subsections, 10.1.7.1 and 10.1.7.2 that are not needed here.
10.2.2.5	Correct the callout to Section 7.3.3 to Section 10.3.5.
11.0	Change percent solids to total suspended solids in the second paragraph.
11.2	Add text to clarify that client approval is needed for subsampling.
11.2.4	Revise the text and add a new Note to clarify the difference between the use of centrifugation of aqueous samples in Section 11.1.1.5 and in this section.
11.2.5 and 11.4.9	Correct the callouts to Section 7.1.6.2 to Section 7.1.6.
13.3	Correct the callout to Section 10.2.3 to Section 10.3.2.
14.5.1	Correct the callouts to Sections 11.3.3, 11.3.2, and 11.4.2 to Sections 11.2.3, 11.3.2, and 11.4.2.

Section	Change
14.5.2	Revise the text to remove two mentions of the quantification methods and the callouts to various related sections. That text is not relevant to the calculation of analyte recovery.
15.1.3	Clarify the text regarding the six target analytes where the ion ratio requirements do not apply, particularly for PFPeA, which may produce a secondary ion, but with too low a signal-to-noise ratio to be reliable for routine use in an ion ratio calculation.
15.2	Add a new term to the equation to explicitly account for the percent solids content of soil, sediment, and biosolids samples when reporting results for these matrices the dry-weight units.
15.3.1	Revise the text in the first paragraph to point to Tables 6 and 8 for the EIS recoveries in diluted extracts. Delete the third paragraph that discussed EIS recoveries in diluted extracts less than 5%. Revise the Note at the end of the Section to point to Tables 6 and 8 for the EIS recoveries in diluted extracts.
15.3.2	Delete the second sentence that prohibits reporting sample results with EIS recoveries less than 5% for compliance monitoring purposes. Clarify that high EIS recoveries for target analytes that are not detected do not require analysis of a diluted sample.
Table 10	Round the m/zs for the parent ions, quantification ions, and confirmation ions to no decimal places to reflect the fact that the instrument is operated at unit mass resolution.
Table 11	Add new rows for laboratory duplicate and field duplicate samples and reorder some of the other rows.
Appendix B	Add more text to the warning about subsampling, reinforcing the fact that client approval is needed.

Acknowledgements

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Disclaimer

See the notice on the title page regarding the status of this method.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Contact

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Method 1633A - Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS

1.0 Scope and Application

1.1 Method 1633A is for use in the Clean Water Act (CWA) for the determination of the per- and polyfluoroalkyl substances (PFAS) in Table 1 in aqueous, solid (soil, biosolids, sediment) and tissue samples by liquid chromatography/mass spectrometry (LC-MS/MS).

1.2 The method calibrates and quantifies PFAS analytes using isotopically labeled standards. Where linear and branched isomers are present in the sample and either qualitative or quantitative standards containing branched and linear isomers are commercially available, the PFAS analyte is reported as a single result calculated from the combined responses of the linear and branched isomers.

1.3 The instrumental portion of this method is for use only by analysts experienced with LC-MS/MS or under the close supervision of such qualified persons. Each laboratory that uses this method must demonstrate the ability to generate acceptable results using the procedure in Section 9.2.

1.4 By their very nature, many components of PFAS present analytical challenges unique to this class of analytes. For example, PFAS analytes readily adhere to the walls of the sample containers and may also stratify in the container. The EPA has included procedures in the method that must be employed to address such challenges (see Section 11.0 and Appendices A and B).

1.5 This method is "performance-based," which means that modifications may be made without additional EPA review to improve performance (e.g., overcome interferences, or improve the sensitivity, accuracy, or precision of the results) *provided that* all performance criteria in this method are met. Requirements for establishing equivalency are in Section 9.1.2 and include 9.1.2.2c. For CWA uses, additional flexibility is described at 40 CFR 136.6. Changes in performance, sensitivity, selectivity, precision, recovery, etc., that result from modifications within the scope of 40 CFR Part 136.6, and Section 9.0 of this method must be documented, as well as how these modifications compare to the specifications in this method. After promulgation, changes outside the scope of 40 CFR Part 136.6 and Section 9.0 of this method may require prior review or approval by the EPA under the Clean Water Act Alternate Test Procedure program described at 40 CFR 136.4 and 136.5.

1.6 The target analytes in Table 1 were included in this method based in part on the availability of standards for both unlabeled and isotopically labeled PFAS compounds at the time that the method was first developed. Data from multi-laboratory validation study data (References 11-14) demonstrate that the method is suitable for the analysis of all 40 target analytes in all of the matrices studied, although there are some performance differences across the analyte classes, which is not surprising given the wide range of structures across the nine classes of compounds in that table. Therefore, the EPA supports use of the method for those analytes, and has identified the analytes in Table 1 that that did not perform as well in the study as others in some sample matrices. (The analytes noted in Table 1 were able to achieve 50 – 150% accuracy or better in most of the analyses from the multi-laboratory validation study.) Data users and laboratories should take that information into account during project planning. In addition, under the allowance for flexibility and method modifications described at 40 CFR 136.6, laboratories may include additional PFAS compounds as target analytes and/or alternative labeled PFAS compounds as authentic standards become commercially available without the need for the EPA review and approval, provided that they complete the requirements in Section 9 for those new analytes.

2.0 Summary of Method

Environmental samples are prepared and extracted using method-specific procedures. Sample extracts are subjected to cleanup procedures designed to remove interferences. Analyses of the sample extracts are conducted by LC-MS/MS in the multiple reaction monitoring (MRM) mode. Sample concentrations are determined by isotope dilution or extracted internal standard quantification (see Section 10.3) using isotopically labeled compounds added to the samples before extraction.

2.1 Extraction

2.1.1 Aqueous samples are spiked with isotopically labeled standards, extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.

2.1.2 Solid samples are spiked with isotopically labeled standards, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

2.1.3 Tissue samples are spiked with isotopically labeled standards, extracted in potassium hydroxide and acetonitrile, followed by basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

2.2 This method measures the analytes as either their anions or neutral forms. The default approach for Clean Water Act uses of the method is to report the analytes in their acid or neutral forms, using the equations in Section 15.2, although the differences between the anion and acid form concentrations are minimal (See Table 2). Other project-specific reporting schemes may be used where required.

2.3 Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions, where applicable.

2.4 Quantitative determination of target analyte concentrations is made with respect to an isotopically labeled PFAS standard; the concentrations are then used to convert raw peak areas in sample chromatograms to final concentrations.

2.5 By virtue of the use of isotope dilution and extracted internal standard quantification (see Section 10.3), the results for the target analytes are corrected for any losses that may occur during sample extraction, extract cleanup, and concentration. Isotope dilution calibration also may address matrix effects that lead to signal suppression or enhancement in the LC-MS/MS system and would otherwise lead to measurement bias. Isotopically labeled compound recoveries are determined by comparison to the responses of one of seven non-extracted internal standards (a.k.a., the "recovery" standards) and are used as general indicators of overall analytical quality.

2.6 The quality of the analysis is assured through reproducible calibration and testing of the extraction, cleanup, and LC-MS/MS systems.

3.0 Definitions

Definitions are provided in the glossary at the end of this method.

4.0 Contamination and Interferences

4.1 Solvents, reagents, glassware, and other sample processing hardware may contain PFAS constituents or may yield artifacts and elevated baselines causing misinterpretation of chromatograms. Specific selection of reagents and solvents may be required.

4.2 Clean all equipment prior to, and after each use to avoid PFAS cross-contamination. Typical cleaning solvents used include water, methanol, and methanolic ammonium hydroxide. The residual PFAS content of disposable plasticware and filters must be verified by batch/lot number and may be used without cleaning if the mass of any PFAS analyte found in a nominal 500-mL aqueous sample is less than the laboratory's method detection limit (MDL).

4.2.1 All glass equipment that is used in the preparation or storage of reagents is cleaned by washing with detergent and baking in a kiln or furnace (Section 6.2.2). After detergent washing, glassware should be rinsed immediately with reagent water. Prior to use, baked glassware must be solvent rinsed and then air dried. A solvent rinse procedure using methanolic ammonium hydroxide (1%), toluene, and methanol is recommended.

4.2.2 All parts of the SPE manifold must be cleaned between samples with methanolic ammonium hydroxide (1%) and air dried prior to use. Sonication with methanolic ammonium hydroxide (1%) may be used for components that will fit in an ultrasonic bath. Smaller parts, like the needles, adapters, reservoirs, and stopcocks associated with the manifold, require rinsing with reagent water prior to manual cleaning or sonicating with methanolic ammonium hydroxide (1%) and air drying. When in use, after loading the samples but prior to elution procedures, the chamber must be rinsed with methanolic ammonium hydroxide (1%). If using an automated SPE system, consult the manufacturer's procedures for equipment cleaning, however, the laboratory is responsible for ensuring that any such procedures are effective, as evidenced by method blanks and other QC results.

4.2.3 All equipment used in the filleting, dissecting, shucking, compositing, and homogenization of tissue must be cleaned with detergent and hot water, then rinsed with ultra-pure water followed by a series of solvent rinses. A typical solvent rinse procedure would be acetone, followed by toluene, and then methanol.

4.3 All materials used in the analysis must be demonstrated to be free from interferences by running method blanks (Section 9.5) at the beginning and with each sample batch (samples started through the extraction process in a given batch during the same work shift, to a maximum of 20 field samples).

4.3.1 The reference matrix must simulate, as closely as possible, the sample matrix being tested. Ideally, the reference matrix should not contain PFAS in detectable amounts (i.e., at or above the laboratory's method detection limits [MDLs]).

4.3.2 For tissue, chicken breast or other similar animal tissue (see Section 7.2.3) may be used as the reference matrix. The laboratory must verify that the source product used does not contain PFAS in detectable amounts (i.e., above the laboratory's MDLs).

4.3.3 When a reference matrix that simulates the sample matrix under test is not available, reagent water (Section 7.2.1) can be used to simulate water samples and Ottawa sand and/or reagent-grade sand (Section 7.2.2) can be used to simulate soils, sediments, and biosolids.

4.4 Interferences co-extracted from samples will vary considerably from source to source, depending on the diversity of the site being sampled. Interfering compounds may be present at concentrations several orders of magnitude higher than the native PFAS. Because low levels of PFAS are measured by this method, elimination of interferences is essential. The cleanup steps given in Section 12.0 can be used to reduce or eliminate these interferences and thereby permit reliable determination of the PFAS at the levels shown in Table 9. The most frequently encountered interferences are fluoropolymers; however, bile salts (e.g., Taurodeoxycholic Acid [TDCA]) may be present in various matrices, including fish and wastewaters, and can interfere in the chromatography. For this reason, analysis of a standard containing, at a minimum, TDCA is required as part of establishing the initial chromatographic conditions (see Sections 10.2.2.5 and 10.3.5) and each analytical sequence (see Section 13.3).

4.5 Each piece of reusable glassware may be numbered to associate that glassware with the processing of a particular sample. This may assist the laboratory in tracking possible sources of contamination for individual samples, identifying glassware associated with highly contaminated samples that may require extra cleaning, and determining when glassware should be discarded. If that approach is used, the numbered glassware should be assigned to field samples, QC samples, and method blanks in a random manner (e.g., do not use the same glassware for method blanks in every batch).

5.0 Safety

5.1 The toxicity or carcinogenicity of each chemical used in this method has not been precisely determined; however, each compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level.

5.1.1 Several PFAS, including PFOA, have been described as likely to be carcinogenic to humans. Pure standards and materials known or suspected to contain PFAS should be handled by trained personnel, with suitable protection to skin and eyes, and care should be taken not to breathe the vapors or ingest the materials.

5.1.2 It is recommended that the laboratory purchase dilute standard solutions of the analytes in this method. However, if primary solutions are prepared, they must be prepared in a hood, following universal safety measures.

5.2 The laboratory is responsible for maintaining a current awareness file of Occupational Safety and Health Administration (OSHA) regulations regarding the safe handling of the chemicals specified in this method. A reference file of safety data sheets (SDS) should also be made available to all personnel involved in these analyses. Additional information on laboratory safety can be found in References 1-4. The references and bibliography at the end of Reference 3 are particularly comprehensive in dealing with the general subject of laboratory safety.

5.3 Samples suspected to contain these compounds should be handled using essentially the same techniques employed in handling radioactive or infectious materials. Well-ventilated, controlled access laboratories are required. Assistance in evaluating the health hazards of particular laboratory conditions may be obtained from certain consulting laboratories and from State Departments of Health or Labor, many of which have an industrial health service. Each laboratory must develop a strict safety program for handling these compounds.

5.3.1 Facility – When finely divided samples (dusts, soils, dry chemicals) are handled, all operations (including removal of samples from sample containers, weighing, transferring, and mixing) should be performed in a glove box demonstrated to be leak tight or in a fume

hood demonstrated to have adequate face velocity. Gross losses to the laboratory ventilation system must not be allowed. Handling of the dilute solutions normally used in analytical work presents no inhalation hazards except in the case of an accident.

5.3.2 Protective equipment – Disposable plastic gloves, apron or lab coat, safety glasses or mask, and a glove box or fume hood with adequate face velocity should be used. During analytical operations that may give rise to aerosols or dusts, personnel should wear respirators equipped with activated carbon filters. Eye protection (preferably full-face shields) must be worn while working with exposed samples or pure analytical standards. Latex gloves are commonly used to reduce exposure of the hands.

5.3.3 Training – Workers must be trained in the proper method of removing contaminated gloves and clothing without contacting the exterior surfaces.

5.3.4 Personal hygiene – Hands and forearms should be washed thoroughly after each manipulation and before breaks (coffee, lunch, and shift) using soaps or detergents that are free of PFAS. Before starting work, staff should avoid the use of personal-care products on exposed skin, because such products may be a source of some PFAS.

5.3.5 Confinement – Isolated work areas posted with signs, segregated glassware and tools, and plastic absorbent paper on bench tops will aid in confining contamination.

5.3.6 Waste Handling – Good technique includes minimizing contaminated waste. Plastic bag liners should be used in waste cans. Janitors and other personnel should be trained in the safe handling of waste.

5.3.7 Laundry – Clothing known to be contaminated should be collected in plastic bags. Persons that convey the bags and launder the clothing should be advised of the hazard and trained in proper handling. The clothing may be put into a washer without contact if the launderer knows of the potential problem. The washer should be run through a cycle before being used again for other clothing.

5.4 Biosolids samples may contain high concentrations of biohazards and must be handled with gloves and opened in a fume hood or biological safety cabinet to prevent exposure. Laboratory staff should know and observe the safety procedures required in a microbiology laboratory that handles pathogenic organisms when handling biosolids samples.

6.0 Equipment and Supplies

Note: *Brand names, suppliers, and part numbers are for illustration purposes only and no endorsement is implied. Equivalent performance may be achieved using apparatus and materials other than those specified here. Meeting the performance requirements of this method is the responsibility of the laboratory. All equipment described below must be constructed of materials that will not react with or sorb PFAS constituents and before use must be demonstrated to be free of PFAS at levels that would be detectable (i.e., at or above the laboratory's MDLs) in blanks or samples. Where available, certification of the PFAS levels of the materials provided by the supplier will suffice. However, in the absence of such certification from the supplier, and in the event of persistent problems with method blanks and other QC samples, the laboratory is responsible for independent testing of all equipment and supplies.*

6.1 Sampling equipment for discrete or composite sampling.

6.1.1 Sample bottles and caps

Note: *Do not use PTFE-lined caps on sample containers. All containers must be demonstrated to be PFAS-free at or below the laboratory's MDLs for the target analytes by testing one or more representative containers from each lot.*

6.1.1.1 Liquid samples (waters, sludges, and similar materials containing < 50 mg solids per sample) – Sample bottle, HDPE, 500-mL, 250-mL, and 125-mL, with linerless HDPE or polypropylene caps.

6.1.1.2 Solid samples (soils, sediments, and biosolids that contain more than 50 mg solids) – Sample bottle or jar, wide-mouth, HDPE, 500-mL, with linerless HDPE or polypropylene caps.

6.1.1.3 Tissue samples – Sample jar, wide-mouth HDPE, 100-mL, with linerless HDPE or polypropylene caps.

6.1.2 Grab sampling equipment – Sample containers may be attached to a metal or wooden pole with stainless steel hose clamps or cable ties in order to reach into flowing waters. Stainless steel scoops or spoons may be used to collect samples of soils, sediments, and biosolids.

6.1.3 Compositing equipment – Because some PFAS are known surfactants, the EPA strongly discourages composite sampling for compliance monitoring (see Section 8.2), but if composite sampling is approved for given project, the equipment described below may be used. Also see Section 8.2.1 for an alternative approach to composite sampling.

If approved and used for a project, automatic or manual compositing system must incorporate properly cleaned containers. An integrating flow meter must be used to collect proportional composite samples. Only HDPE tubing must be used. If the sampler uses a peristaltic pump, a minimum length of compressible silicone rubber tubing may be used in the pump only. Before use, each lot of tubing must be thoroughly rinsed with methanol, followed by repeated rinsing with reagent water to minimize sample contamination. The final reagent water rinse should be collected and analyzed for PFAS to confirm that the tubing is suitable for use.

6.2 Equipment for glassware cleaning

Note: *If blanks from glassware show no detectable PFAS at or above the laboratory's MDLs when using fewer cleaning steps than described above, unnecessary cleaning steps and equipment may be eliminated.*

6.2.1 Laboratory sink with overhead fume hood

6.2.2 Kiln – Capable of reaching 450 ºC within 2 hours and maintaining 450 - 500 ºC ± 10 ºC, with temperature controller and safety switch (Cress Manufacturing Co., Santa Fe Springs, CA, B31H, X31TS, or equivalent). For safety, the kiln or furnace should be vented outside the laboratory, or to a trapping system.

6.3 Equipment for sample preparation

6.3.1 Disposable polyethylene or nitrile gloves

6.3.2 Laboratory fume hood (of sufficient size to contain the sample preparation equipment listed below)

6.3.3 Glove box (optional)

6.3.4 Meat grinder – Hobart, or equivalent, with 3- to 5-mm holes in inner plate

6.3.5 Equipment for determining percent moisture

6.3.5.1 Oven – Capable of maintaining a temperature of 105 ± 5 ºC

6.3.5.2 Desiccator

6.3.6 Balances

6.3.6.1 Analytical – Capable of weighing 0.1 mg

6.3.6.2 Top loading – Capable of weighing 10 mg

6.3.7 Aluminum foil - food grade

6.3.8 Disposable spoons, 10 mg, polypropylene or stainless steel

6.3.9 Ultrasonic mixer (sonicator) – Immersion style, for use with tissue samples

6.3.10 HDPE bottles, with linerless HDPE or polypropylene caps – 60 mL

6.3.11 pH Paper, range 0-14 - (Whatman® Panpeha™ or equivalent), 0.5-unit readability (papers with other pH ranges may be suitable as well)

6.3.12 Analog or digital vortex mixer, single or multi-tube (Fisher Scientific 02-215-452, or equivalent)

6.3.13 Volumetric flasks, Class A

6.3.14 Disposable polypropylene collection tubes (13 x 100 mm, 8 mL)

6.3.15 Variable speed mixing table (Fisherbrand™ Nutating mixer or equivalent)

6.4 Filtration

6.4.1 Silanized glass wool (Sigma-Aldrich, Cat # 20411 or equivalent) – store in a clean glass jar and rinsed with methanol (2 times) prior to use.

6.4.2 Disposable syringe filter, 25-mm, 0.2-µm Nylon membrane, PALL/Acrodisc or equivalent

6.4.3 Glass fiber filter, 47-mm, PALL A/E or equivalent, for use in determining total suspended solids

6.5 Centrifuge apparatus

6.5.1 Centrifuge (Thermo Scientific Legend RT+, 16-cm rotor, or equivalent), capable of reaching at least 1610 RCF (3,000 rpm for the model cited)

6.5.2 Centrifuge tubes – Disposable polypropylene centrifuge tubes (50 mL)

6.6 Pipettes

6.6.1 Norm-Ject® syringe (or equivalent), polypropylene/HDPE, 5 mL

6.6.2 Variable volume pipettes with disposable HDPE or polypropylene tips (10 µL to 5 mL) – used for preparation of calibration standards and spiked samples.

6.6.3 Disposable glass pipettes

6.6.4 Calibrated mechanical pipettes or Hamilton graduated syringes

6.7 Solid-phase extraction

6.7.1 Solid-phase extraction (SPE) cartridges (Waters Oasis WAX 150 mg, Cat # 186002493 or equivalent). The SPE sorbent must have a conjugate acid pKa above 8 so that it remains positively charged during the extraction.

Note: *SPE cartridges with a different bed volume (e.g., 500 mg) may be used; however, the laboratory must demonstrate that the bed volume does not negatively affect analyte absorption and elution, by performing the initial demonstration of capability analyses described in Section 9.2.*

6.7.2 Vacuum manifold for SPE Cartridges (Waters™ extraction manifold #WAT200607 or equivalent)

6.8 Evaporation

6.8.1 Automatic or manual solvent evaporation system (TurboVap® LV or equivalent)

6.8.2 Evaporation/concentrator tubes: 60-mL clear glass vial, 30 x 125 mm, without caps (Wheaton Cat # W226060 or equivalent). Cover with foil if required.

6.9 Vials

6.9.1 Snap cap/crimp top vials, 300 µL, polypropylene (12 x 32 mm) – used in sample pre-screening (DWK Life Sciences Cat # 225180 or equivalent)

6.9.2 Polypropylene crimp/snap vials, 1 mL (Agilent Cat # 5182-0567 or equivalent)

6.9.3 Clear snap cap, polyethylene, 11 mm (Fisher Scientific # 03-375-24E, or equivalent)

6.9.4 Single step filter vials (Restek Thomson SINGLE StEP® Standard Filter Vials, 0.2-µm Nylon membrane, with Black Preslit caps Cat # 25891 or equivalent) – used in sample pre-screening.

6.10 Instrument

6.10.1 Ultra high-performance liquid chromatograph (UPLC, also called UHPLC) or high-performance liquid chromatograph (HPLC) equipped with tandem quadrupole mass spectrometer (Waters Xevo TQ-S Micro or equivalent) capable of collecting at least 10 scans across a chromatographic peak

6.10.2 C18 column, 1.7 µm, 50 x 2.1 mm (Waters Acquity UPLC® BEH or equivalent)

6.10.3 Guard column (Phenomenex Kinetex® Evo C18 or equivalent)

6.10.4 Trap/delay column (Purospher Star RP-18 endcapped [3 µm] Hibar® RT 50-4 or equivalent)

6.11 Bottles, HDPE or glass, with linerless HDPE or polypropylene caps. Various sizes. To store prepared reagents.

7.0 Reagents and Standards

7.1 Reagents

Reagents prepared by the laboratory may be stored in either glass or HDPE containers. Proper cleaning procedures (Section 4.2) must be followed prior to using the containers. Before use, all reagents described below must be demonstrated to be free of PFAS at levels that would be detectable in blanks or samples (i.e., at or above the laboratory's MDLs). Where available, certification of the PFAS levels of the reagents provided by the supplier will suffice. However, in the absence of such certification from the supplier, and in the event of persistent problems with method blanks and other QC samples, the laboratory is responsible for independent testing of each lot.

7.1.1 Acetic acid (concentrated) – ACS grade or equivalent, store at room temperature

7.1.2 Acetic acid (0.1%) – dissolve acetic acid (1 mL) in reagent water (1 L), store at room temperature, replace after 3 months.

7.1.3 Acetonitrile – UPLC grade or equivalent, verified before use, store at room temperature

7.1.4 Ammonium acetate – (Caledon Ultra LC/MS grade, or equivalent), store at 2-8 °C, replace 2 years after opening date

7.1.5 Ammonium hydroxide – certified ACS+ grade or equivalent, 30% in water, store at room temperature, and replace 2 years after opening date

7.1.6 Aqueous ammonium hydroxide (3%) – add ammonium hydroxide (10 mL, 30%) to reagent water (90 mL), store at room temperature, replace after 3 months

7.1.7 Methanolic ammonium hydroxide

7.1.7.1 Methanolic ammonium hydroxide (0.3% v/v) – add ammonium hydroxide (1 mL, 30%) to methanol (99 mL), store at room temperature, replace after 1 month

7.1.7.2 Methanolic ammonium hydroxide (1% v/v) – add ammonium hydroxide (3.3 mL, 30%) to methanol (97 mL), store at room temperature, replace after 1 month

7.1.7.3 Methanolic ammonium hydroxide (2% v/v) – add ammonium hydroxide (6.6 mL, 30%) to methanol (93.4 mL), store at room temperature, replace after 1 month

7.1.8 Methanolic potassium hydroxide (0.05 M) – add 3.3 g of potassium hydroxide to 1 L of methanol, store at room temperature, replace after 3 months

7.1.9 Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid (v/v) – add ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank (Section 7.3.6) and is used to dilute the extracts of samples that exceed the calibration range (see Section 15.3).

7.1.10 Eluent A – Acetonitrile, Caledon Ultra LCMS grade or equivalent

7.1.11 Eluent B – 2 mM ammonium acetate in 95:5 water/acetonitrile. Dissolve 0.154 g of ammonium acetate (Section 7.1.4) in 950 mL of water and 50 mL of acetonitrile (Caledon Ultra LCMS grade, or equivalent). Store at room temperature, shelf life 2 months.

7.1.12 Formic acid – (greater than 96% purity or equivalent), verified by lot number before use, store at room temperature

7.1.13 Formic acid

7.1.13.1 Formic acid (aqueous, 0.1 M) – dissolve formic acid (4.6 g) in reagent water (1 L), store at room temperature, replace after 2 years

7.1.13.2 Formic acid (aqueous, 0.3 M) – dissolve formic acid (13.8 g) in reagent water (1 L), store at room temperature, replace after 2 years

7.1.13.3 Formic acid (aqueous, 5% v/v) – mix 5 mL formic acid with 95 mL reagent water, store at room temperature, replace after 2 years

7.1.13.4 Formic acid (aqueous, 50% v/v) – mix 50 mL formic acid with 50 mL reagent water, store at room temperature, replace after 2 years

7.1.13.5 Formic acid (methanolic 1:1, 0.1 M formic acid/methanol) – mix equal volumes of methanol and 0.1 M formic acid, store at room temperature, replace after 2 years

7.1.14 Methanol – (HPLC grade or better, 99.9% purity), verified by lot number before use, store at room temperature

7.1.15 Potassium hydroxide – certified ACS or equivalent, store at room temperature, replace after 2 years

7.1.16 Reagent water – Laboratory reagent water, test by lot/batch number for residual PFAS content

7.1.17 Carbon – EnviCarb® 1-M-USP or equivalent, verified by lot number before use, store at room temperature. Loose carbon allows for better adsorption of interferent organics.

Note: *The single-laboratory validation laboratory achieved better performance with loose carbon than carbon cartridges and therefore loose carbon was used for the multi-laboratory validation to establish statistically based method performance criteria. Laboratories have the flexibility to implement the use of carbon cartridges, as long as all method QC criteria are met (see 40 CFR 136.6).*

7.1.18 Toluene – HPLC grade, verified by lot number before use. Store at room temperature.

7.1.19 Acetone – Pesticide grade, verified by lot number before use in rinsing tissue dissection and processing equipment.

7.2 Reference matrices – Matrices in which PFAS and interfering compounds are not detected by this method. These matrices are to be used to prepare the batch QC samples (e.g., method blanks, and ongoing precision and recovery samples).

7.2.1 Reagent water – purified water, Type I

7.2.2 Solids reference matrix – Ottawa or reagent-grade sand

7.2.3 Tissue reference matrix – chicken breast or similar animal tissue

7.3 Standard solutions – Prepare from materials of known purity and composition or purchase as solutions or mixtures with certification to their purity, concentration, and authenticity. Observe the safety precautions in Section 5.

Purchase of commercial standard solutions or mixtures is highly recommended for this method; however, when these are not available, preparation of stock solutions from neat materials may be necessary. Some PFAS, notably the fluorinated carboxylic acids, will esterify in anhydrous acidic methanol. To such prevent esterification, standards must be stored under basic conditions. If base is not already present, this may be accomplished by the addition of sodium hydroxide when standards are diluted in methanol. If the chemical purity is 98% or greater, the weight may be used without correction to calculate the concentration of the standard. Dissolve an appropriate amount of assayed reference material in the required solvent. For example, weigh 10 to 20 mg of an individual compound to three significant figures in a 10-mL ground-glass-stoppered volumetric flask and fill to the mark with the required solvent. Once the compound is completely dissolved, transfer the solution to a clean vial and cap.

When not being used, store standard solutions in the dark at less than 6 °C, but not frozen, unless the vendor recommends otherwise, in screw-capped vials with foiled-lined caps. Place a mark on the vial at the level of the solution so that solvent loss by evaporation can be detected. Discard the solution if solvent loss has occurred.

Note: *Native PFAS standards are available from several suppliers. Isotopically labeled compounds are available from Cambridge Isotope Laboratories and Wellington Laboratories but may also be available from other suppliers. Listing of these suppliers does not constitute a recommendation or endorsement for use. All diluted solutions must be stored in glass or HDPE containers that have been thoroughly rinsed with methanol.*

^{18}O-mass labeled perfluoroalkyl sulfonates may undergo isotopic exchange with water under certain conditions, which lowers the isotopic purity of the standards over time. Similarly, some of the deuterated standards may undergo isotopic exchange in protic solvents such as methanol.

The laboratory must maintain records of the certificates for all standards, as well as records for the preparation of intermediate and working standards, for traceability purposes. Copies of the certificates must be provided as part of the data packages in order to check that proper calculations were performed.

7.3.1 Extracted Internal Standard (EIS) – (a.k.a. isotopically labeled compounds) The EIS solution containing the isotopically labeled compounds listed in Table 3 is prepared in methanol from prime stocks. An aliquot of EIS solution, typically 50 µL, is added to each sample prior to extraction. Table 3 presents the nominal amounts of the EIS compounds added to each sample and that reflect the masses of each EIS contained in the calibration standards.

Note: *Larger EIS amounts may be added to samples for which pre-screening results (see Section 11.0) indicate that the sample extract will require dilution, provided that the extract dilution will result in approximately the same masses of the EIS compounds as are found in the calibration standards (assuming 100% recovery). Alternatively, if a laboratory wishes to routinely use larger EIS amounts, the standards used for the initial calibration and calibration verification must be prepared with similar EIS amounts and new calibrations performed. Otherwise, the results of all such analyses using larger EIS amounts than specified in the method must be qualified as "estimates" for reporting purposes.*

The list of EIS compounds in Table 3 represents the compounds that were available at the time this method was validated. The EPA strongly recommends that additional isotopically labeled PFAS compounds be included as EIS compounds as soon as practical once they become commercially available.

7.3.2 Non-Extracted Internal Standard (NIS) – The NIS solution containing the isotopically labeled compounds listed in Table 3 as non-extracted internal standards is prepared in methanol from prime stock. An aliquot of NIS solution, typically 50 µL, is added to each sample prior to instrumental analysis. Table 3 presents the nominal amounts of NIS compounds added to each sample. As with the EIS solution above, larger amounts of the NIS compounds may be used for samples known to require extract dilution.

7.3.3 Native Standards Solution – Prepare a spiking solution, containing the target analytes listed in Table 1, in methanol from prime stocks. The solution is used to prepare the calibration standards and to spike the known reference QC samples that are analyzed with every batch. Quantitative standards containing a mixture of branched and linear isomers must be used for target analytes if they are commercially available. Currently, these include PFOA, PFOS, PFHxS, PFOSA, PFNA, NMeFOSAA, NEtFOSAA, NMeFOSA, NEtFOSA,

NMeFOSE, and NEtFOSE. Additional mixtures of branched and linear isomers must be included as soon as practical once they become commercially available.

7.3.4 Calibration standard solutions – A series of calibration solutions containing the target analytes and the ^{13}C-, ^{18}O-, and deuterium-labeled EIS and NIS compounds is used to establish the initial calibration of the analytical instrument. The concentration of the target analytes in the solutions varies to encompass the working range of the instrument, while the concentrations of the EIS and NIS remain constant. The calibration solutions are prepared using methanol, 2% methanolic ammonium hydroxide, reagent water, acetic acid, and the target analyte and isotopically labeled compound standard solutions. After dilution, the solvent composition of the final calibration solutions will approximate the solvent composition of the sample extracts, which contain methanol with roughly 4% water (due to the solubility of water from the sample in the methanolic extraction fluid), 1% ammonium hydroxide and about 0.6% acetic acid (also see Section 7.1.9). Calibration standard solutions do not undergo solid-phase extraction/cleanup.

Concentrations for the seven calibration solutions used in the validation studies are presented in Table 4. A minimum of six contiguous calibrations standards is required for a valid analysis when using a linear calibration model, with at least five of the six calibration standards being within the quantitation range (e.g., from the Limit of Quantitation [LOQ] to the highest calibration standard). If a second-order calibration model is used, then a minimum of seven calibration standards is required, with at least six of the seven calibration standards within the quantitation range. The lowest level calibration standard must meet a signal-to-noise ratio of 3:1 for the quantitation ions and confirmation ions, and 10:1 for quantitation ions that have no confirmation ion, and be at a concentration less than or equal to the LOQ. The calibration is verified with a standard in the middle of the laboratory's calibration range, i.e., the CS4 standard in Table 4 if using the default calibration range in that table. In addition, an instrument sensitivity check (ISC) standard at the concentration of the laboratory's LOQ must be analyzed at the beginning of each analytical run (Section 10.3.3.1 and Section 13.3). The concentration of ISC will be laboratory-specific, based on the demonstrated LOQ in each laboratory (i.e., it is not necessarily the lowest calibration standard analyzed).

Note: *Laboratories may choose to analyze standards at levels lower than the lowest calibration standard listed in the method when the instrument sensitivity allows, and the S/N ratio criterion is met. Conversely, laboratories may choose to eliminate or add calibration standards at the upper end of the calibration, depending on the linearity of their instrument. At a minimum, the EIS compounds in Table 3 must be used, but laboratories are strongly encouraged to include additional stable isotope analogues to quantify the associated target analytes as they become commercially available. Laboratories are also encouraged to replace the deuterated EIS compounds with the corresponding ^{13}C- or ^{18}O-labeled analogues of the target analytes, if and when they become commercially available.*

7.3.5 Qualitative Identification Standards – Standards that contain mixtures of the branched and linear isomers of the target analytes and that are used for comparison against suspected branched isomer peaks in field samples. These qualitative identification standards are **not** required for those analytes where the quantitative standards in Section 7.3.3 already contain the branched and linear isomers. Qualitative identification standards must be included as soon as practical once they become commercially available.

7.3.6 Instrument Blank – During the analysis of a batch of samples, a solvent blank is analyzed after standards (e.g., calibration, CV) and based on screening results or prior knowledge of the source, after samples containing high levels of target analytes to monitor carryover from the previous injection. The instrument blank consists of the solution in Section 7.1.9 fortified with the EIS and NIS compounds for quantitation purposes.

7.3.7 Stability of solutions – Standard solutions used for quantitative purposes (Sections 7.3.1 through 7.3.5) should be assayed periodically (e.g., every 6 months) against certified standard reference materials (SRMs) from the National Institute of Science and Technology (NIST), if available, or certified reference materials from a source accredited under ISO Guide 17034 (Reference 16) that attests to the concentration, to assure that the composition and concentrations have not changed.

7.4 Mass calibration and mass calibration verification solutions – Use the mass calibration solution specified by the instrument manufacturer.

7.5 Bile salt interference check standard containing Taurodeoxycholic Acid (TDCA) or Sodium taurodeoxychloate hydrate – (Sigma Aldrich 580221-5GM, or equivalent). This standard is used to evaluate the chromatographic program relative to the risk of an interference from bile salts in samples when using acetonitrile as the mobile phase in the instrument. Prepare solution at a concentration of 1 µg/mL in the same solvent as the calibration standards. If using other mobile phases, it will be necessary to evaluate taurochenodeoxycholic acid (TCDCA) (Sigma Aldrich T6260-1G, or equivalent) and tauroursodeoxycholic acid (TUDCA) (Sigma Aldrich 580549-1GM, or equivalent) as well.

8.0 Sample Collection, Preservation, Storage, and Holding Times

8.1 Collect samples in HDPE containers following conventional sampling practices (Reference 5). All sample containers must have linerless HDPE or polypropylene caps. Other sample collection techniques, or sample volumes may be used, if documented.

8.2 Aqueous samples

8.2.1 Because some PFAS are known surfactants, the EPA strongly discourages composite sampling for Clean Water Act compliance monitoring. Therefore, samples from sources that flow freely (e.g., effluents or in-process waste streams) are collected as grab samples. Collect multiple sample aliquots in HDPE bottles that have been lot-certified to be PFAS-free. Do not fill the bottle past the shoulder, to allow room for expansion during frozen storage, if needed.

In addition, PFAS have been shown to be enriched in the surface layer of natural waters (References 17 - 19). Therefore, procedures used to collect samples from still waters in particular must consider that enrichment. For example, if the purpose of the sampling is to characterize the PFAS content of the waterbody, samples should be collected from below the surface to avoid the enrichment in the surface layer. Conversely, if the purpose is to make a worst-case assessment of the transfer of PFAS from the waterbody to the atmosphere or biota in contact with the surface layer, the sampling procedures should include the surface layer. As with all sampling activities, the specific procedures used should be documented in a sampling plan or other quality system documentation.

For aqueous sources other than leachates that have not been analyzed previously, the nominal sample size is 500-mL. For sources that are known or expected to contain levels of any target analytes above the calibration range, smaller samples may be collected in smaller size containers, provided that the volume analyzed is sufficient to meet any regulatory limits. Because the target analytes are known to bind to the interior surface of the sample container, the entire aqueous sample that is collected must be prepared and analyzed and subsampling avoided whenever possible. Therefore, if a sample volume smaller than 500 mL is to be used for analysis, collect the sample in an appropriately sized HDPE container.

Note: *In the absence of source-specific information (e.g., historical data) on the levels of PFAS or project-specific requirements, collect at least three aliquots of all aqueous samples to allow sufficient volume for an original whole-volume analysis, a re-extraction and second analysis, and for the determination of total suspended solids and for pre-screening analysis. That third aliquot may be collected in a smaller sample container (e.g., 250-mL or 125-mL).*

If composite sampling is approved for given project, the equipment described in Section 6.1.3 may be used to collect samples in refrigerated bottles using automated sampling equipment. Alternatively, a manual composite sample can be created by collecting multiple small-volume samples in appropriately sized HDPE containers, manually combining them in a 500-mL HDPE container in the laboratory, rinsing each of the original containers with basic methanol, using those rinsates to rinse the 500-mL container, and then adding the combined rinsate to the SPE cartridge as described in Sec. 12.2.2.

8.2.2 Leachate samples from landfills can present significant challenges and therefore only 100 mL of sample is collected for the analysis. Collect three 100-mL leachate sample aliquots in a similar manner as described in Section 8.2.1, using appropriately sized containers that have been lot-certified to be PFAS-free.

8.2.3 Maintain all aqueous samples protected from light and at or below 6 ºC from the time of collection until shipped to the laboratory. Samples must be shipped with sufficient ice to maintain the sample temperature at or below 6 ºC during transport for a period of at least 48 hours to allow for shipping delays. The laboratory must confirm that the sample temperature is at or below 6 ºC upon receipt. Once received by the laboratory, the samples may be stored at 0 - 6 ºC or at or below -20 ºC, until sample preparation. However, the allowable holding time for samples depends on the storage temperature, as described in Section 8.5, so samples should be shipped to the laboratory as soon as practical.

8.3 Solid samples (soil, sediment, biosolids), excluding tissue

8.3.1 Collect samples using wide-mouth HDPE jars that have been lot-certified to be PFAS-free and fill no more than ¾ full (see Section 6.1.1.2 for container size and type).

8.3.2 Maintain solid samples protected from light (in HDPE containers) from the time of collection until receipt at the laboratory. Samples must be shipped with sufficient ice to maintain the sample temperature at or below 6 ºC for a period of at least 48 hours to allow for shipping delays. The laboratory must confirm that the sample temperature is at or below 6 ºC upon receipt. Once received by the laboratory, the samples may be stored at 0 - 6 ºC or at or below -20 ºC, until sample preparation. However, the allowable holding times for samples depend on the storage temperature, as described in Section 8.5, so samples should be shipped to the laboratory as soon as practical.

8.4 Fish and other tissue samples

The nature of the tissues of interest may vary by project. Field sampling plans and protocols should explicitly state the samples to be collected and if any processing will be conducted in the field (e.g., filleting of whole fish or removal of organs) and those details are beyond the scope of this method. All field procedures must involve materials and equipment that have been shown to be free of PFAS.

8.4.1 Fish may be cleaned, filleted, or processed in other ways in the field, such that the laboratory may expect to receive whole fish, fish fillets, or other tissues for analysis.

8.4.2 If whole fish are collected, wrap the fish in aluminum foil or insert into food-grade polyethylene tubing, and maintain at or below 6 ºC from the time of collection until receipt at the laboratory, to a maximum time of 24 hours. The laboratory must confirm that the sample temperature is at or below 6 ºC upon receipt. If a longer transport time is necessary, freeze the sample before shipping. Ideally, fish should be frozen upon collection and shipped to the laboratory on dry ice. Other project-specific holding times and shipping conditions may be used where required.

8.4.3 Once received by the laboratory, the samples must be maintained protected from light at or below -20 ºC until prepared. If subsequently homogenized in Section 11.4, store unused sample tissue mass in HDPE containers or wrapped in aluminum foil at or below -20 ºC.

8.5 Holding times

Based on studies conducted during the validation of this method (see References 10 and 15) and subsequent evaluations by DoD, sample holding times for PFAS in field samples are specific to the matrix type, the analyte class, and the storage temperature. Holding times for the sample extracts reflect issues associated with transformation of several analytes. If the analytical results are to be used for NPDES compliance monitoring purposes, the laboratory **must** meet the sample and extract holding times for those analytes that are listed in the discharge permit. For other analytes or other uses of the method, consult the project planning documentation. The sample and extract holding times are discussed by matrix type in Sections 8.5.1 to 8.5.5 and summarized in Section 8.5.6.

8.5.1 Aqueous samples (including leachates) should be analyzed as soon as practical; however, samples may be held in the laboratory for up to 28 days from collection when stored at 0 - 6 ºC and protected from the light. But as noted in Reference 15, conversion of certain perfluorooctane sulfonamide ethanols and perfluorooctane sulfonamidoacetic acids has been observed after 7 days. Specifically, NMeFOSE and NEtFOSE may undergo transformation to NMeFOSAA and NEtFOSAA respectively when stored at 0 - 6 ºC, but not when stored at or below -20 ºC. Therefore, if NMeFOSE, NEtFOSE, NMeFOSAA and/or NEtFOSAA are analytes of concern for a given permit or project, either store the samples at or below -20 ºC, or extract the samples within 7 days of collection.

When stored at or below -20 ºC and protected from the light, aqueous samples may be held for up to 90 days for all analytes.

8.5.2 Soil and sediment samples may be held for up to 90 days if stored by the laboratory in the dark at either 0 - 6 ºC, or at below -20 ºC. However, some soils and sediments may exhibit microbial growth when stored at 0 - 6 ºC. Because of its instability, if NFDHA is an important analyte for a given project, samples should be extracted within 3 days of collection (see Reference 10), regardless of storage temperature.

8.5.3 If whole fish, field-filleted fish, or other seafood samples are frozen within 48 hours of the time of collection (i.e., either in the field or as soon as the samples are received at the laboratory or other storage facility), the holding time for tissue samples does **not** begin at the time of collection, but when further processing for analysis begins (e.g., lab-filleting, grinding, or removal of specific tissues for analysis). When analyses are performed for regulatory purposes, prepared tissue sample aliquots may be held for up to 90 days, if stored by the laboratory in the dark at or below -20 ºC. For other uses of the method, consult the project planning documentation. In cases where NFDHA is an analyte of concern for a project, samples should be extracted within 3 days of collection.

8.5.4 Biosolids samples may be held for up to 90 days if stored by the laboratory in the dark at 0 - 6 ºC, but preferably at or below -20 ºC (see Reference 10). Because microbiological activity in biosolids samples at 0 - 6 ºC may lead to production of gases which may cause the sample to be expelled from the container when it is opened, as well as noxious odors, the EPA recommends that biosolids samples be frozen if they are to be stored for more than a few days before extraction.

8.5.5 Extracts from all matrix types may be held for up to 90 days if stored in the dark at either 0 - 6 ºC, or at or below -20 °C, until analyzed, with the caveat that issues were observed for 11Cl-PF3OUdS and 9Cl-PF3ONS after 28 days (see Reference 10). These issues may elevate the observed concentrations of these two ether sulfonates in the extract over time.

8.5.6 The holding times for samples and extracts are summarized below by storage temperature and matrix type.

	When Stored at 0 - 6 °C		**When Stored at ≤ -20 °C**	
Field Samples by Matrix Type	**Holding Time**	**Exceptions**	**Holding Time**	**Exceptions**
Aqueous, including leachates	28 days	7 days, if NMeFOSE, NEtFOSE, NMeFOSAA, and/or NEtFOSAA are analytes of interest	90 days	None
Soils and sediments	90 days	3 days, if NFDHA is an analyte of interest	90 days	3 days, if NFDHA is an analyte of interest
Biosolids	90 days	None	90 days	None
Tissues	90 days	3 days, if NFDHA is an analyte of interest	90 days	None

	When Stored at either 0 - 6 °C or at ≤ -20 °C	
Sample Extracts	**Holding Time**	**Exceptions**
All Matrix Types	90 days	28 days, if 11Cl-PF3OUdS and/or 9Cl-PF3ONS are analytes of interest

9.0 Quality Control

9.1 Each laboratory that uses this method is required to operate a formal quality assurance program (Reference 6). The minimum requirements of this program consist of an initial demonstration of laboratory capability, analysis of samples spiked with isotopically labeled compounds to evaluate and document data quality, and analysis of standards and blanks as tests of continued performance. Laboratory performance is compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

If the method is to be applied to a sample matrix other than water (e.g., solids and tissues), the appropriate alternative reference matrix (Sections 7.2.2 - 7.2.3) is substituted for the reagent water matrix (Section 7.2.1) in all performance tests.

9.1.1 The laboratory must make an initial demonstration of the ability to generate acceptable precision and recovery with this method. This demonstration is given in Section 9.2.

9.1.2 In recognition of advances that are occurring in analytical technology, and to overcome matrix interferences, the laboratory is permitted certain options to improve separations or lower the costs of measurements. These options include alternative extraction, concentration, and cleanup procedures, and changes in sample volumes, columns, and detectors. Alternative determinative techniques and changes that degrade method performance are *not* allowed without prior review and approval (see 40 CFR 136.4 and 136.5).

Note: *For additional flexibility to make modifications without prior EPA review, see 40 CFR Part 136.6.*

9.1.2.1 Each time a modification is made to this method, the laboratory is required to repeat the procedure in Section 9.2. If calibration will be affected by the change, the instrument must be recalibrated per Section 10. Once the modification is demonstrated to produce results in a relevant reference matrix and are equivalent or superior to results produced by this method as written, that modification may be used routinely thereafter, so long as the other requirements in this method (e.g., isotopically labeled compound recovery) are met in both the initial demonstration in Section 9.2 and in field samples and other QC samples.

9.1.2.2 The laboratory is required to maintain records of any modifications made to this method. These records include the following, at a minimum:

a) The names, titles, business addresses, and telephone numbers of the analyst(s) that performed the analyses and modification, and of the quality control officer that witnessed and will verify the analyses and modifications.

b) A listing of pollutant(s) measured, by name and CAS Registry number.

c) A narrative stating reason(s) for the modifications (see Section 1.5).

d) Results from all quality control (QC) tests comparing the modified method to this method, including:

i. Calibration (Section 10)
ii. Calibration verification (Section 14.3)
iii. Initial precision and recovery (Section 9.2.1)
iv. Isotopically labeled compound recovery (Section 9.3)
v. Analysis of blanks (Section 9.5)
vi. Accuracy assessment (Section 9.4)

e) Data that will allow an independent reviewer to validate each determination by tracing the instrument output (peak height, area, or other signal) to the final result. These data are to include:

i. Sample numbers and other identifiers
ii. Extraction dates
iii. Analysis dates and times
iv. Analysis sequence/run chronology
v. Sample weight or volume (Section 11)
vi. Extract volume prior to each cleanup step (Section 12)
vii. Extract volume after each cleanup step (Section 12)
viii. Injection volume (Section 13.3)
ix. Dilution data, differentiating between dilution of a sample or an extract (Section 15.3)
x. Instrument
xi. Column (dimensions, liquid phase, solid support, film thickness, etc.)
xii. Operating conditions (temperatures, temperature program, flow rates)
xiii. Detector (type, operating conditions, etc.)
xiv. Chromatograms, printer tapes, and other recordings of raw data
xv. Quantitation reports, data system outputs, and other data to link the raw data to the results reported

9.1.2.3 Alternative columns and column systems – If a column or column system other than those specified in this method is used, that column or column system must meet all the requirements of this method.

Note: *The use of alternative columns or programs will likely result in a different elution order.*

9.1.3 Analyses of method blanks are required on an on-going basis to demonstrate the extent of background contamination in any reagents or equipment used to prepare and analyze field samples (Section 4.3). The procedures and criteria for analysis of a method blank are described in Section 9.5.

9.1.4 The laboratory must spike all samples with isotopically labeled compounds to monitor method performance. This test is described in Section 9.3. When results of these spikes indicate atypical method performance for samples, the samples are diluted to evaluate whether the performance issue is caused by the sample matrix. Procedures for dilution are given in Section 15.3.

9.1.5 The laboratory must, on an ongoing basis, demonstrate that the analytical system is in control through calibration verification and the analysis of ongoing precision and recovery standards (OPR), spiked at low (LLOPR) and mid-level, and blanks. These procedures are given in Sections 14.3 through 14.7. Other important checks of the analytical system include the ISC (Section 14.1), the bile salt interference check (Section 14.2), and the use of the qualitative identification standard (Section 14.8).

9.1.6 The laboratory must maintain records to define the quality of data generated. Development of accuracy statements is described in Section 9.4.

9.2 Initial Demonstration of Capability

9.2.1 Initial precision and recovery (IPR) – To establish the ability to generate acceptable precision and recovery, the laboratory must perform the following operations for each sample matrix type to which the method will be applied by that laboratory.

9.2.1.1 Extract, concentrate, and analyze four aliquots of the matrix type to be tested (Section 7.2.1 through 7.2.3), spiked with 200 µL of the native standard solution (Section 7.3.3), 50 µL of the EIS solution (Section 7.3.1), and 50 µL of NIS solution (Section 7.3.2). At least one method blank matching the matrix being analyzed must be prepared with the IPR batch. In the event that more than one method blank was prepared and analyzed with the IPR batch, all blank results must be reported. All sample processing steps that are to be used for processing samples, including preparation and extraction (Sections 11.2 – 11.4), cleanup (Section 12.0) and concentration (Section 12.0), must be included in this test.

9.2.1.2 Using results of the set of four analyses, compute the average percent recovery of the extracts and the relative standard deviation (RSD) of the concentration for each target analyte and EIS compound.

9.2.1.3 For each target analyte, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Tables 5 and 7. Table 5 includes the required IPR QC acceptance limits for the target analytes in aqueous samples that were derived from the multi-laboratory validation study. Table 6 contains the required acceptance limits for the recoveries of EIS compounds in both individual aqueous QC samples (including the IPR, OPR, and LLOPR) and field samples that were derived from the multi-laboratory validation study. Table 7 includes the required IPR QC acceptance limits for the target analytes in solids and biosolids, and tissues. Table 8 contains the required acceptance limits for the EIS compounds in solid, biosolid, and tissue QC samples (including the IPR, OPR, and LLOPR) and field samples that were derived from the multi-laboratory validation study. For all matrices, if RSD and % recovery for all target analytes meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin. If, however, any individual RSD exceeds the precision limit or any individual % recovery falls outside the range for recovery, system performance is unacceptable for that compound. Correct the problem and repeat the test (Section 9.2). There are no limits for the *mean* recoveries or RSD for the EISs in the four IPR aliquots in any of the matrix types, but each individual IPR aliquot must meet the matrix type-specific EIS recovery criteria in either Table 6 or Table 8.

The NIS recoveries *in each IPR aliquot* must be meet the acceptance limits in Section 14.9. There are no limits for mean NIS recovery or NIS RSD in the IPR aliquots.

9.2.2 Method detection limit (MDL) - Each laboratory must also establish MDLs for all the target analytes using the MDL procedure at 40 CFR Part 136, Appendix B. Example matrix-specific pooled method detection limits are listed in Table 9.

9.2.3 The limit of quantitation (LOQ) is the smallest concentration that produces a quantitative result with known and recorded precision and bias. In this method, the LOQ is established by each laboratory at or above the concentration of the lowest initial calibration standard that falls within their demonstrated quantitation range. For the purposes of this method, The EPA considers the terms “Minimum Level,” “reporting limit,” “quantitation limit,” and “limit of quantitation” to be synonymous.

9.2.4 Historically in other methods, the EPA has calculated the minimum level of quantification (ML) by multiplying the MDL by 3.18 and rounding the result to the nearest 1, 2 or 5 x 10^n,

where n is zero or an integer, or tied the ML to the concentration of the lowest calibration standard (see the Glossary for further details), thus providing a simple benchmark for the overall sensitivity of a method. With the addition of the LOQ concept in Section 9.2.3 above, the ML for this method has been tied to the LOQ.

9.3 To assess method performance on the sample matrix, the laboratory must spike all samples with the EIS solution (Section 7.3.1) and all sample extracts with the NIS solution (Section 7.3.2).

9.3.1 Analyze each sample according to the procedures in Sections 11.0 through 16.0.

9.3.2 Compute the percent recovery of the EIS compounds using the non-extracted internal standard method (Section 15.2) and the equation in Section 14.5.2.

9.3.3 The recovery of each EIS compound in an aqueous sample must be within the limits in Table 6, which are the required QC acceptance limits for aqueous samples, including landfill leachates, that were derived from the multi-laboratory validation study. The recovery of each EIS compound in soil, sediment, biosolid, or tissue sample must be within the limits in Table 8, which are the required QC acceptance limits for those matrices that were derived from the multi-laboratory validation study. If the recovery of any EIS falls outside of these limits, method performance is unacceptable for that EIS in that sample. Additional cleanup procedures or limited dilution of the sample extract may be employed to attempt to bring the EIS recovery within the acceptance normal range.

If the recovery cannot be brought within the acceptance limits after extract dilution or additional cleanup procedures have been employed, then the laboratory must take a smaller aliquot of any affected aqueous sample, dilute it to 500 mL with reagent water and prepare an analyze the diluted sample, or must prepare and analyze a smaller aliquot of soil, sediment, biosolid, or tissue sample, per Section 15.3.

9.4 Records of the recovery of EIS and NIS compounds from samples must be maintained and should be assessed periodically.

9.4.1 After the analysis of 30 samples of a given matrix type (aqueous, solids, tissues, etc.), compute the recovery and the standard deviation of the percent recovery (S_R) for the isotopically labeled compounds only. Express the assessment as a percent recovery interval from R - $2S_R$ to R + $2S_R$ for each matrix. For example, if R = 90% and S_R = 10% for 30 analyses of soil, the recovery interval is expressed as 70 to 110%.

9.4.2 Update the accuracy assessment for each isotopically labeled compound in each matrix on a regular basis (e.g., after each five to ten new preparation batches).

9.5 Method blanks – A method blank is analyzed with each sample batch (Section 4.3) to demonstrate freedom from contamination. The matrix for the method blank must be similar to the sample matrix for the batch (e.g., reagent water blank [Section 7.2.1], solids blank [Section 7.2.2], or tissue blank [Section 7.2.3]).

9.5.1 Analyze the cleaned extract (Section 12.0) of the method blank aliquot before the analysis of the OPRs (Section 14.5).

9.5.2 If any PFAS is found in the blank at 1) at a concentration greater than the LOQ for the analyte, 2) at a concentration greater than one-third the regulatory compliance limit, or 3) at a concentration greater than one-tenth the concentration in a sample in the extraction batch,

whichever is greatest, analysis of samples must be halted, and the problem corrected. Other project-specific requirements may apply; therefore, the laboratory may adopt more stringent acceptance limits for the method blank at their discretion. If the contamination is traceable to the extraction batch, the laboratory should check solvents, glassware, and other potential sources of PFAS contamination. Samples affected by the blank must be re-extracted and analyzed along with a new method blank and other batch-specific QC, provided that enough sample volume is available, and the sample are still within holding time.

If the new blank also exhibits contamination and additional volume of the associated samples is not available for re-extraction ana analysis, the laboratory must document and report the failures (e.g., as qualifiers on results), unless the failures are not required to be reported as determined by the regulatory/control authority. Results associated with blank contamination for an analyte regulated in a discharge cannot be used to demonstrate regulatory compliance. QC failures do not relieve a discharger or permittee of reporting timely results.

9.6 The specifications contained in this method can be met if the apparatus used is calibrated properly and then maintained in a calibrated state. The standards used for initial calibration (Section 10.3), calibration verification (Section 14.3), and for initial (Section 9.2.1) and ongoing (Section 14.5) precision and recovery may be prepared from the same source; however, the use of a secondary source for calibration verification is highly recommended whenever available. If standards from a different vendor are not available, a different lot number from the same vendor can be considered a secondary source. A LC-MS/MS instrument will provide the most reproducible results if dedicated to the settings and conditions required for determination of PFAS by this method.

9.7 Laboratory duplicates –A laboratory duplicate analysis is not required for NPDES compliance monitoring. There are established concerns about partitioning of some PFAS to surfaces and suspended solids in aqueous samples. If a particular project specifically requests a laboratory duplicate be performed for aqueous samples, then the requestor is responsible for providing additional container(s) of that sample, must provide their acceptance criterion for the relative percent difference (% RPD) of such laboratory duplicates, and provide any corrective actions that must be taken when the % RPD criterion is not met. For samples of other matrices, the requestor either must provide sufficient additional sample mass in the original container or an additional container, along with the acceptance criterion and corrective actions.

9.8 Depending on specific program requirements, field duplicates may be collected to determine the precision of the sampling technique.

Note: *Laboratory Duplicates and Field Duplicates are not one and the same. Field Duplicates are meant to evaluate potential sampling error and are evaluated by the project, not the laboratory. If the requestor provides field duplicates for a given project, the laboratory should not be held to an acceptance criterion because of the potential sampling error involved in field duplicates.*

9.9 Matrix spikes generally are not required for methods that employ isotope dilution quantification because any deleterious effects of the matrix should be evident in the recoveries of the EIS compounds spiked into every sample. The analysis of matrix spike samples may help diagnose the potential impact of matrix interferences for specific target analytes or sample matrices.

10.0 Calibration and Standardization

10.1 Mass Calibration

The mass spectrometer must undergo mass calibration to ensure accurate assignments of m/z's by the instrument. This mass calibration must be performed at least annually or as recommended by the instrument manufacturer, whichever is more frequent, to maintain instrument sensitivity and stability. Mass calibration must be repeated on an as-needed basis (e.g., QC failures, ion masses fall outside of the required mass window, major instrument maintenance, or if the instrument is moved). Mass calibration must be performed using the calibration compounds and procedures prescribed by the manufacturer.

Multiple Reaction Monitoring (MRM) analysis is required to achieve better sensitivity than full-scan analysis. The default parent ions, quantitation ions (Q1), and confirmation (Q2) ions that were monitored during the validation of this method are listed in Table 10 for each target analyte, EIS, and NIS compounds.

10.1.1 During the development of this method, instrumental parameters were optimized for the precursor and product ions of the linear isomers of the target analytes listed on Table 10. If a qualitative or quantitative standard containing an isomeric mixture (branched and linear isomers) of an analyte is commercially available for an analyte, the quantification ion used must be the quantification ion identified in Table 10, unless interferences render the product ion unusable as the quantification ion. In cases where interferences render the product ion unusable, consult the client before using the alternative product ion and document the reason for the change when reporting results. However, the use of ions with lower masses or common ions that may not provide sufficient discrimination between target analytes and co-eluting interferences must be avoided.

10.1.2 Optimize the response of the precursor ion $[M-H]^-$ or $[M-CO_2]^-$ for each target analyte, EIS, and NIS compound, following the manufacturer's guidance. MS parameters (e.g., source voltages, source and desolvation temperatures, gas flow, etc.) must be methodically changed until optimal analyte responses are determined. Typically, carboxylic acids have similar MS/MS conditions and sulfonic acids have similar MS/MS conditions. However, since analytes may have different optimal parameters, some compromise on the final operating conditions may be required.

10.1.3 Establish suitable operating conditions using the manufacturer's instructions and use the MS conditions below that were used during the development of this method as guidance.

Operating Conditions for Waters Acquity UPLC, TQ-S Xevo MS/MS

Injection volume	2.0 µL (*This is the default volume, and may be changed to improve performance*)	
MS/MS Conditions	Ionization Mode	Negative ESI
	Source Temp (ºC)	140
	Desolvation Temp (°C)	500
	Capillary Voltage (kV)	0.70
	Cone Gas (L/h)	~70
	Desolvation gas (L/h)	~800

10.1.4 As noted above, perform the mass calibration following the instrument manufacturer's instructions, using the calibrant prescribed by the manufacturer.

10.1.5 Regardless of the calibrant used, mass calibration is judged on the basis of the presence or absence of the exact calibration masses (e.g., a limit on the number of masses that are "missed"). If peaks are missing or not correctly identified, adjust the MS/MS, and repeat the test. Only after the MS/MS is properly calibrated may standards, blanks, and samples be analyzed.

10.1.6 Mass spectrometer optimization – Prior to measurements of a given analyte the mass spectrometer must be separately optimized for that analyte.

10.1.6.1 Using the post-column pump, separately infuse a solution containing each compound in methanol into the MS.

10.1.6.2 Optimize sensitivity for the product ion m/z for each analyte. Precursor-product ion m/z's other than those listed may be used provided requirements in this method are met.

10.1.6.3 After MS calibration and optimization and LC-MS/MS calibration, the same LC-MS/MS conditions must be used for analysis of all standards, blanks, IPR and OPR standards, and samples.

10.1.7 Mass Calibration Verification

The mass calibration must be verified after each subsequent mass calibration, at the frequency indicated in Table 11. The laboratory must follow the instructions for their instrument software to confirm the mass calibration, mass resolution, and peak relative response. If the manufacturer's instructions include options for evaluation of mass resolution, the tightest resolution requirements (typically called unit resolution) must be met.

10.2 Chromatographic conditions

10.2.1 The chromatographic conditions should be optimized for compound separation (including analytes with both linear and branched isomers) and for sensitivity. The same optimized operating conditions must be used for the analysis of all standards, blanks, IPR and OPR standards, and samples. The following table gives the suggested chromatographic conditions for this method using the specified instrument and column. Different instruments may require slightly different operating conditions. **Modification of the solvent composition of the standard or extract by increasing the aqueous content to prevent poor peak shape is not permitted.** The peak shape of early eluting compounds may be improved by increasing the volume of the injection loop or increasing the aqueous content of the initial mobile phase composition.

General LC Conditions

Column Temp (°C) 40

Max Pressure (bar) 1100.0

LC Gradient Program

Time (min)	Flow mixture [1,2]	Flow Rate Program	Gradient Curve
0.0	2% eluent A, 98% eluent B	0.35 mL/min	Initial
0.2	2% eluent A, 98% eluent B	0.35 mL/min	2
4.0	30% eluent A, 70% eluent B	0.40 mL/min	7
7.0	55% eluent A, 45% eluent B	0.40 mL/min	8

General LC Conditions

9.0	75% eluent A, 25% eluent B	0.40 mL/min	8
10.0	95% eluent A, 5% eluent B	0.40 mL/min	6
10.4	2% eluent A, 98% eluent B	0.40 mL/min	10
11.8	2% eluent A, 98% eluent B	0.40 mL/min	7
12.0	2% eluent A, 98% eluent B	0.35 mL/min	1

[1] Eluent A = Acetonitrile [2] Eluent B = 2 mM ammonium acetate in 95:5 water/acetonitrile

Note: *LC system components, as well as the mobile phase constituents, may contain many of the analytes in this method. Thus, these PFAS will build up on the head of the LC column during mobile phase equilibration. To minimize the occurrence of background PFAS peaks and to keep baseline levels constant, the time that the LC column sits at initial conditions must be kept constant and as short as possible (while ensuring reproducible retention times). In addition, priming the mobile phase and flushing the column with at least 90% methanol before initiating a sequence may reduce background contamination.*

10.2.2 Retention time calibration

10.2.2.1 Inject solution(s) containing the target analytes and the EIS and NIS compounds to determine their retention times. The laboratory may want to inject analytes/compounds separately the first time they perform the calibration. All target compounds for which there is an isotopically labeled analog will elute slightly before or with the labeled analog. Store the retention time (RT) for each compound in the data system. The retention time window must include all isomers present in the isomeric standard mixtures (qualitative or quantitative).

10.2.2.2 Once RT windows have been confirmed for each target analyte, EIS, and NIS compound, then once per ICAL and at the beginning of the analytical sequence, the position of all target analyte, EIS, and NIS peaks shall be set using the midpoint standard of the ICAL curve when ICAL is performed. When an ICAL is not performed, the initial CV retention times or the midpoint standard of the ICAL curve can be used to establish the RT window position.

10.2.2.3 The RTs for the target analytes, EIS, and NIS compounds must fall within 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial CV, whichever was used to establish the RT window position for the analytical batch. All branched isomer peaks identified in either the calibration standard or the qualitative (technical grade) standard also must fall within 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial CV.

10.2.2.4 For all target analytes with exact corresponding isotopically labeled analogs, target analytes must elute within 0.1 minutes of the associated EIS compound. (The laboratory may use relative retention times (RRTs) of the target analytes and their labeled analogs as an alternative, provided that they also develop corresponding RRT acceptance criteria that are at least as stringent as those described here.)

10.2.2.5 When establishing the chromatographic conditions, it is important to ensure adequate chromatographic separation to avoid potential interference from bile salts during analyses of samples. Inject the bile salt interference check standard containing TDCA (see Section 7.5 if the mobile phase is not acetonitrile) during

the retention time calibration process and adjust the conditions to ensure that TDCA (or TDCA, TCDCA and TUDCA) does not coelute with any of the target analytes, EIS, or NIS compounds. The laboratory must demonstrate that the analytical conditions provide a separation of at least 1 minute between the bile salts and the retention time window of PFOS, as described in Section 10.3.5. In order to ensure adequate chromatographic separation of the target analytes, the method requires this evaluation when establishing the chromatographic conditions and on an ongoing basis, **regardless of the sample matrices to be analyzed**.

10.3 Initial calibration

Initial calibration is performed using a series of at least six solutions, with at least five of the six calibration standards being within the quantitation range, and with the lowest standard at or below the LOQ. (If a second-order calibration model is used, then one additional concentration is required, with at least six of the seven calibration standards within the quantitation range.) The initial calibration solutions contain the entire suite of EIS and NIS compounds, and target analytes. Calibration is verified with a calibration verification (CV) standard prior to sample analysis, at least once every ten injections of a field sample extract, and at the end of the analytical sequence by analysis of a mid-level calibration solution. Calibration verification uses the mean RRs or RFs determined from the initial calibration to calculate the analyte concentrations in the verification standard.

Note: *Six calibration standards is the minimum number that must be used in the initial calibration; however, the laboratory may use more standards, as long as the criteria in Section 10.3.3.3 can be met.*

Prior to the analysis of samples, and after the mass calibration verification has met all criteria in Sections 10.1.4 and 10.1.7, each LC-MS/MS system must be calibrated at a minimum of six standard concentrations (Section 7.3.4 and Table 4). This method procedure calibrates and quantifies 40 target analytes, using the isotopically labeled compounds added to the sample prior to extraction, by one of two approaches:

- True isotope dilution quantification (ID), whereby the response of the target analyte is compared to the response of its isotopically labeled analog. Twenty-four target compounds are quantified in this way.
- Extracted internal standard quantification (EIS), whereby the response of the target analyte is compared to the response of the isotopically labeled analog of another compound with chemical and retention time similarities. Sixteen target compounds are quantified in this way.

10.3.1 Initial calibration frequency

Each LC-MS/MS system must be calibrated whenever the laboratory takes an action that changes the chromatographic conditions or might change or affect the initial calibration criteria, or if either the CV or Instrument Sensitivity Check (ISC) acceptance criteria have not been met.

10.3.2 Initial calibration procedure

Prepare calibration standards containing the target compounds, EIS, and NIS compounds. The concentrations described in Table 4 are those used in the validation studies and are provided as guidance. Standards at other concentrations may be used, and wider calibration

ranges with standards either above or below the concentrations in Table 4 are allowed, provided that at least 6 contiguous standards are used, with the lowest standard at or below the LOQ (see Section 10.3), and that all of the conditions in Section 10.3.3 are met. Analyze each calibration standard by injecting 2.0 µL (this volume may be changed to improve performance).

Note: *The same injection volume must be used for all standards, samples, blanks, and QC samples.*

10.3.3 Initial calibration calculations

10.3.3.1 Instrument sensitivity

Sufficient instrument sensitivity is established if a signal-to-noise ratio ≥ 3:1 for the quantification ions and the confirmation ions, or ≥ 10:1 if the analyte only has a quantification ion, can be achieved when analyzing the lowest concentration standard within the quantitation range that the laboratory includes in its assessment of calibration linearity.

10.3.3.2 Response Ratios (RR) and Response Factors (RF)

The response ratio (RR) for each native compound calibrated by isotope dilution is calculated according to the equation below, separately for each of the calibration standards, using the areas of the quantification ions (Q1) with the m/z shown in Table 10. RR is used for the 24 compounds measured by true isotope dilution quantification.

$$RR = \frac{Area_t \, M_{EIS}}{Area_{EIS} \, M_t}$$

where:

$Area_t$ = Measured area of the Q1 m/z for the target analyte
$Area_{EIS}$ = Measured area at the Q1 m/z for the corresponding isotopically labeled PFAS used as the EIS in the calibration standard
M_{EIS} = Mass of the isotopically labeled PFAS used as the EIS in the calibration standard
M_t = Mass of the target analyte in the calibration standard

Similarly, the response factor (RF) for each native compound calibrated by extracted internal standard is calculated according to the equation below. RF is used for the 16 compounds measured by extracted internal standard quantification.

$$RF = \frac{Area_t \, M_{EIS}}{Area_{EIS} \, M_t}$$

where:

$Area_t$ = Measured area of the Q1 m/z for the target analyte
$Area_{EIS}$ = Measured area at the Q1 m/z for the isotopically labeled PFAS used as the EIS in the calibration standard
M_{EIS} = Mass of the isotopically labeled PFAS used as the EIS in the calibration standard
M_t = Mass of the target analyte in the calibration standard

A response factor (RF_s) is calculated for each EIS compound in the calibration standard using the equation below. RF_s is used for the 24 isotopically labeled compounds measured by non-extracted internal standard quantification.

$$RF_s = \frac{Area_{EIS}\, M_{NIS}}{Area_{NIS}\, M_{EIS}}$$

where:

$Area_{EIS}$ = Measured area of the Q1 m/z for the EIS compound added to the sample before extraction

$Area_{NIS}$ = Measured area at the Q1 m/z for the NIS compound in the calibration standard

M_{NIS} = Mass of the NIS compound in the calibration standard

M_{EIS} = Mass of the EIS compound added to the sample before extraction

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Note: *Other calculation approaches may be used, such as a weighted linear regression or non-linear regression, based on the capability of the data system used by the laboratory. If used, the regression must be weighted inversely proportional to concentration and must not be forced through zero. Analysts should consult their instrument vendor for details on regression calibration models. When using a weighted regression calibration, linearity must be assessed using Option 2 below.*

10.3.3.3 Instrument Linearity

One of the following two approaches must be used to evaluate the linearity of the instrument calibration:

Option 1: Calculate the relative standard deviation (RSD) of the RR or RF values for each target analyte and isotopically labeled compound for all the initial calibration standards that were analyzed. The RSD must be ≤ 20% to establish instrument linearity.

$$mean\ RR\ or\ RF = \frac{\sum_{i=1}^{n}(RR\ or\ RF)_i}{n}$$

$$SD = \sqrt{\frac{\sum_{i=1}^{n}(RR\ or\ RF_i - mean\ RR\ or\ RF)^2}{n}}$$

$$RSD = \frac{SD}{mean}\ x\ 100$$

where:

$RR\ or\ RF_i$ = RR or RF for calibration standard *i*

n = Number of calibration standards

Option 2: Calculate the relative standard error (RSE) for each target analyte and EIS compound for all the initial calibration standards that were analyzed. The RSE for all target analytes and EIS compounds must be ≤ 20% to establish instrument linearity.

$$RSE = 100 \times \sqrt{\sum_{i=1}^{n} \frac{\left[\frac{x_i' - x_i}{x_i}\right]^2}{n-p}}$$

where,
x_i = Nominal concentration (true value) of each calibration standard
x_i' = Measured concentration of each calibration standard
n = Number of standard levels in the curve
p = Type of curve (2 = linear, 3 = quadratic)

In addition, although not required, it may be useful to compare the actual responses for each standard to the calibration model. Differences outside of a window of 70 – 130% of the modeled concentration may be cause for concern.

Note: *The correlation coefficient, r, and the coefficient of determination, r^2, are no longer considered appropriate metrics for linearity and shall not be used in conjunction with this method.*

10.3.3.4 Non-extracted Internal Standard Area

Each time an initial calibration is performed, use the data from all the initial calibration standards used to meet the linearity test in Section 10.3.3.3 to calculate the mean area response for each of the NIS compounds, using the equation below.

$$Mean\ Area_{NIS_i} = \frac{\sum Area_{NIS_i}}{n}$$

where:
$Area_{NIS_i}$ = Area counts for the *ith* NIS, where *i* ranges from 1 to 7, for the seven NIS compounds listed in Table 1
n = Number of ICAL standards (the default value is n = 6). If a different number of standards is used for the ICAL, for example, to increase the calibration range or by dropping a point at either end of the range to meet the linearity criterion, change 6 to match the actual number of standards used.

Record the mean areas for each NIS compound for use in evaluating results for sample analyses (see Section 14.9).

10.3.4 Initial calibration corrective actions

If the instrument sensitivity or the instrument linearity criteria for initial calibration are not met, inspect the system for problems and take corrective actions to achieve the criteria. This may require the preparation and analysis of fresh calibration standards or performing a new initial calibration. All initial calibration criteria must be met before any samples or required blanks are analyzed.

10.3.5 Bile salts interference check

The laboratory must analyze a bile salt interference check standard (see Section 7.5) after the initial calibration and during each analytical sequence (see Section 13.3) as a check on the chromatographic conditions, **regardless of the sample matrix to be analyzed**. If an interference is present, the chromatographic conditions must be modified to eliminate the interference from the bile salts (e.g., changing the conditions such that the retention time of the bile salts fall outside the retention time window for any of the linear or branched PFOS

isomers in the standard described in Section 7.3.3 by at least one minute), and the initial calibration repeated.

11.0 Sample Preparation and Extraction

For aqueous samples that contain particles and solid samples, percent solids are determined using the procedures in Section 11.1. This section describes the sample preparation procedures for aqueous samples with < 50 mg solids in the sample volume to be extracted (Section 11.2), solid (soil, sediment or biosolid) samples (Section 11.3) and tissue samples (Section 11.4).

Absent of source-specific knowledge of the PFAS levels in samples or project-specific requirements, the laboratory must pre-screen all samples prior to performing the quantitative analysis (see Appendix A). For aqueous samples, use the secondary container provided for total suspended solids to perform the pre-screening. If high levels of PFAS are present in the sample, a lower volume may be required for analysis.

Note: *The laboratory may subsample the aqueous samples as described in Appendix B; however, subsampling must meet project-specific requirements. The laboratory must notify the client before proceeding with the preparation of a subsample, in the event that a more appropriate size sample can be collected and sent to the laboratory. Once the laboratory becomes familiar with the levels of PFAS in the samples for their clients, the samples should be collected in the appropriate sample container size to avoid subsampling. The sample data report must state when subsampling has been employed.*

Do not use any fluoropolymer articles or task wipes in these extraction procedures. Use only HDPE or polypropylene wash bottles and centrifuge tubes. Reagents and solvents for cleaning syringes may be kept in glass containers.

11.1 Determination of solids contents of samples

Two types of solids determinations are described in this method. The first is the determination of the total suspended solids (TSS) content of aqueous samples. Because aqueous samples are processed with SPE cartridges that can be clogged by suspended solids in the sample, the method recommends a limit of 50 mg of solids in the total volume of sample that is processed by SPE.

The second type of solids determination is the percent solids (% solids) of soil, sediment, and biosolids samples. The percent solids is used to report results for these sample matrices as dry-weight concentrations. (Tissue samples do not require any solids determination.)

Note: *The earlier drafts of Method 1633 described the determination of percent solids for both aqueous and solid matrices, in an attempt to "simplify" the procedures across matrix types. However, in practice, the use of TSS for aqueous matrices is a more straightforward way to examine the risk of clogging the SPE and the results do not need to be as accurate as the percent solids data used for reporting dry-weight concentrations of the other matrices.*

11.1.1 Determination of total suspended solids (TSS) in aqueous matrices

11.1.1.1 Desiccate and weigh a glass fiber filter (Section 6.4.3) in milligrams (mg) to two significant figures.

11.1.1.2 Filter 10.0 ± 0.02 mL of well-mixed sample through the filter. This volume is sufficient for the purposes of assessing the risk of clogging the SPE cartridge.

11.1.1.3 Dry the filter a minimum of 1 hour at 103 - 105 ºC and cool in a desiccator.

11.1.1.4 Calculate TSS as follows:

$$TSS\ (mg/L) = \frac{weight\ of\ sample\ aliquot\ after\ drying\ (mg) - weight\ of\ filter\ (mg)}{0.01\ L}$$

11.1.1.5 Multiply the TSS by the volume of the sample aliquot to be extracted, in liters, to obtain the milligrams of solids in the sample. If the sample volume contains more than 50 mg of TSS, at a minimum, the analyst may choose to prepare a second SPE cartridge (see the Note in Section 12.1.4) prior to start the extraction in the event of clogging. Subject to project-specific approval, laboratories may utilize other documented strategies for minimizing the disruptions due to SPE clogging and slow extractions, including centrifuging the sample before adding the EIS and treating the supernatant aqueous phase and the solid phase as separate samples. In this case, a rinse of the original container must be included in the extraction of either the aqueous phase or solid phase. The bottle rinse for an aqueous sample should be added to the aqueous portion of the sample in most cases, but if there is visible solid left in the bottle, the laboratory has discretion to add the bottle rinse to the solid portion of the sample. In extreme cases, such as aqueous samples with TSS >10%, the entire sample might be treated as a sediment sample.

11.1.1.6 In the absence of client-specific requirements, an alternative to determining the TSS may be to identify samples likely to contain more than 50 mg of solids by visual comparison to examples maintained in the laboratory. More specifically, a trained analyst should be able to distinguish samples with very low TSS and focus the TSS determinations on only those samples that might present a risk of clogging. However, given the translucent nature of HDPE containers, this may require pouring a small volume of sample from the container designated for the solids determination into a clear glass vessel. If this is done, that volume should be discarded after the assessment.

11.1.1.7 Regardless of the approach used, the laboratory must maintain records of the manner in which the solids content of each aqueous sample was assessed.

11.1.2 Determination of percent solids in soils, sediments, and biosolids

11.1.2.1 Weigh 5 to 10 g of sample to three significant figures in a tared beaker.

11.1.2.2 Dry a minimum of 12 hours at 110 ± 5 ºC, and cool in a desiccator and weigh the beaker.

11.1.2.3 Calculate percent solids as follows:

$$\%\ solids = \frac{weight\ of\ sample\ aliquot\ after\ drying\ (g)}{weight\ of\ sample\ aliquot\ before\ drying\ (g)} \times 100$$

11.2 Aqueous sample processing

This method was validated with aqueous samples containing no more than 50 mg of suspended solids per sample. The procedure requires the preparation of the entire sample and samples containing large amounts of suspended solids are likely to clog the SPE media, dramatically slowing or precluding sample extraction. Smaller sample volumes may be analyzed for samples containing solids greater than that specified for this method, or when unavoidable due to high levels of PFAS; however, subsampling should be avoided whenever possible and requires client approval. The preferred approach is to collect samples in smaller-size containers (e.g., less than 500 mL) and analyze the entire sample, provided that any regulatory limits can be met using the smaller volume.

The nominal sample size for wastewater, surface water, and groundwater and their associated QC samples is 500 mL; however, sample size may be increased up to 1,000 mL if required for a specific project. The sample is to be analyzed in its entirety and must not be filtered. Leachate samples and their associated QC samples are analyzed using a 100-mL sample volume. Therefore, leachates must not be included in the same sample preparation batch as other aqueous samples that are analyzed using 500-mL sample volumes.

11.2.1 Homogenize the sample by inverting the sample 3 – 4 times and allowing the sample to settle. Do not filter the sample. The standard procedure is to analyze the entire sample, plus a basic methanol rinse of the container (Sec. 12.2.2).

11.2.2 The volume of the aqueous sample analyzed is determined by weighing the full sample bottle and then the empty sample bottle (see Section 12.2). Weigh each sample bottle (with the lid) to 0.1 g.

11.2.3 Prepare a method blank and two OPRs using PFAS-free water in HDPE bottles. Select a volume of water that is typical of the samples in the batch (nominally 500 mL). Spike one OPR sample with native standard solution (Section 7.3.3) at 2x the LOQ (LLOPR). This aliquot will serve to verify the LOQ. Spike the other OPR sample at the concentration of the mid-level calibration point (e.g., CS4 in Table 4). This aliquot will serve as the traditional OPR.

Note: *If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples with the native standards solution (Section 7.3.3) at concentrations roughly 3 to 5 times the background concentration determined during screening of the unspiked sample, but not to exceed the calibration range. This may require multiple spiking solutions. If screening was not performed, then spike those samples at the concentration of the mid-level calibration point.*

11.2.4 Spike an aliquot of EIS solution (Section 7.3.1) directly into the sample in the original bottle (or subsampled bottle) as well as to the bottles prepared for the QC samples. Mix by swirling the sample container.

Note: *Except as described in Section 11.1.1.5, where centrifugation is used to create two separate samples, when centrifugation is used to prevent samples with high TSS from clogging the SPE, but the solids are extracted along with the supernatant liquid, the EIS compounds must be spiked into the original sample container prior to centrifugation.*

11.2.5 Using a PFAS-free pipette or other device, transfer a few drops of the sample to pH paper and check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid (Section 7.1.13.4) or ammonium hydroxide (or with 5% formic acid [Section 7.1.13.3] and 3%

aqueous ammonium hydroxide [Section 7.1.6]). The sample is now ready for solid-phase extraction (SPE) and cleanup (Section 12.0).

11.3 Solid sample processing (excluding tissues)

Use a stainless spoon to mix the sample in its original jar. If it is impractical to mix the sample within its container, transfer the sample to a larger container. Remove rocks, invertebrates, and foreign objects. Vegetation can either be removed from the sample before homogenization or cut into small pieces and included in the sample, based on project requirements. Mix the sample thoroughly, stirring from the bottom to the top and in a circular motion along the sides of the jar, breaking particles to less than 1 mm by pressing against the side of the container. The homogenized sample should be even in color and have no separate layers. Store the homogenized material in its original container or in multiple smaller containers. Determine the percent solids per Section 11.1.2.

Note: *The maximum sample weight for sediment or soil is 5 g dry-weight. The maximum sample weight for biosolids is 0.5 g dry-weight.*

Small amounts of the PFAS-free reagent water (10% of sample weight or less) can be added to unusually dry samples to facilitate extraction. This is an option, not a requirement, and if used, the solid method blank, OPR, and LLOPR associated with the samples must contain similar amounts of added water.

11.3.1 Weigh out an aliquot of solid sample, not dried (aliquot should provide 5 g dry-weight for soil and sediment or 0.5 g dry-weight for biosolids) into a 50-mL polypropylene centrifuge tube. Because biosolids samples are analyzed with a 0.5-g sample, they must not be included in the same sample preparation batch as solid samples analyzed with nominal 5-g sample masses.

11.3.2 Prepare batch QC samples using 5 g of reference solid (Section 7.2.2) wetted with 2.5 g of reagent water for the method blank and two OPRs (use 0.5 g of reference solid with 0.25 g of reagent water for biosolid sample batches). The addition of reagent water to the sand provides a matrix closer in composition to real-world samples. Spike one OPR sample with the native standards solution (Section 7.3.3) at 2x the LOQ (LLOPR). This aliquot will serve to verify the LOQ. Spike the other OPR sample at the concentration of the mid-level calibration point. This aliquot will serve as the traditional OPR.

Note: *If matrix spikes are required for a specific project, spike the field sample aliquots designated as MS/MSD samples with the native standards solution (Section 7.3.3) at concentrations roughly 3 to 5 times the background concentration determined during screening of the unspiked sample, but not to exceed the calibration range. This may require multiple spiking solutions. If screening was not performed, then spike those samples at the concentration of the mid-level calibration point.*

11.3.3 Spike an aliquot of EIS solution (Section 7.3.1) directly into each centrifuge tube containing the aliquoted field and QC samples. Vortex the sample to disperse the standard and allow to equilibrate for at least 30 minutes.

11.3.4 Add 10 mL of 0.3% methanolic ammonium hydroxide (Section 7.1.7.1) to each centrifuge tube. Vortex to disperse, then shake for 30 minutes on a variable speed mixing table. Centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and transfer the supernatant to a clean 50-mL polypropylene centrifuge tube.

11.3.5 Add 15 mL of 0.3% methanolic ammonium hydroxide (Section 7.1.7.1) to the remaining solid sample in each centrifuge tube. Vortex to disperse, then shake for 30 minutes on a variable speed mixing table. Centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and decant the supernatant from the second extraction into the centrifuge tube with the supernatant from the first extraction.

11.3.6 Add another 5 mL of 0.3% methanolic ammonium hydroxide (Section 7.1.7.1) to the remaining sample in each centrifuge tube. Shake by hand to disperse, centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and decant the supernatant from the third extraction into the centrifuge tube with supernatant from the first and second extractions.

11.3.7 Using a 10-mg scoop, add 10 mg of carbon (Section 7.1.17) to the combined extract, mix by occasional hand shaking for 5 minutes and no more, and then centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes. Immediately decant the extract into a 60-mL glass evaporation or concentrator tube.

11.3.8 The laboratory has the option to dilute the extract to approximately 35 mL with reagent water. (Some laboratories may prefer not to add any additional water; therefore, this dilution is optional.) A separate concentrator tube marked at the 35-mL level may be kept for a visual reference to get the approximate volume. Samples containing more than 50% water may yield extracts that are greater than 35 mL in volume; therefore, do not add water to these. Determine the water content in the sample as follows (percent moisture is determined from the % solids):

$$Water\ Content\ in\ Sample = \frac{Sample\ Weight\ (g) \times Moisture\ (\%)}{100} + any\ water\ added\ in\ 11.3.2\ and\ 11.3.8$$

11.3.9 Concentrate each extract at approximately 55 ºC with a N_2 flow of approximately 1.2 L/min to a final volume that is based on the water content of the sample (*see table below*). Allow extracts to concentrate for 25 minutes, then mix (by vortex if the volume is < 20 mL or using a glass pipette if the volume is > 20 mL). Continue concentrating and mixing every 10 minutes until the extract has been reduced to the required volume as specified in the table below. If the extract volume appears to stop dropping, the concentration must be stopped and the volume at which it was stopped recorded. The concentrated extract must still contain some methanol, about 5-10 mL. The pre-cleanup extract in 11.3.10 should contain no more than 20% methanol. The laboratory has flexibility to modify the volumes used to achieve this goal. Some laboratories may prefer not to add water in Section 11.3.8. The following table provides guidance to help determine the final extract volume, based on the water content of the original solid sample.

Water Content in Sample*	Concentrated Final Volume
< 5 g	7 mL
5 - 8 g	8 mL
8 - 9 g	9 mL
9 - 10 g	10 mL

* Based on the % solids result determined in Section 11.1.2.3, and including any water added to the sample in Sections 11.3.2 or the extract in Section 11.3.8.

A good rule of thumb is to make the "Concentrated Final Volume" 7 - 10 mL above the "Water Content in Sample" value.

Note: *Slowly concentrating extracts, in 1-mL increments, is necessary to prevent excessive concentration and the loss of neutral compounds (N-methyl and N-ethyl FOSEs and FOSAs) and other more volatile compounds. The extract must be concentrated to remove the methanol because excess methanol present during SPE clean-up results in poor recovery of C_{13} and C_{14} carboxylic acids and C_{10} and C_{12} sulfonates.*

If all of the methanol is evaporated, the aforementioned neutral compounds are likely to have poor recovery, if too much methanol is in the final concentrated extract, then the aforementioned longer-chain compounds are likely to have poor recovery.

11.3.10 Add 40 - 50 mL of reagent water to the extract and vortex. Check that the pH is 6.5 ±0.5 and adjust as necessary with 50% formic acid (Section 7.1.13.4) or 30% ammonium hydroxide (or with 5% formic acid [Section 7.1.13.3] and 3% aqueous ammonium hydroxide [Section 7.1.6]). The extracts are ready for SPE and cleanup (Section 12.0).

11.4. Tissue sample processing

Prior to processing tissue samples, the laboratory must determine the exact tissue to be analyzed. Common requests for analysis of fish tissue include whole fish with the skin on, whole fish with the skin removed, edible fish fillets (filleted in the field or by the laboratory), specific organs, and other portions. Once the appropriate tissue has been determined, the samples must be prepared and homogenized.

If the laboratory must dissect the whole fish to obtain the appropriate tissue for analysis, cover the benchtop with clean aluminum foil and use clean processing equipment (e.g., knives, scalpels, tweezers) to dissect each sample to prevent cross-contamination. Samples should be handled in a semi-thawed state for compositing and/or homogenization. All tissue comprising a sample is collected in a tared stainless-steel bowl during grinding or maceration, the total tissue mass weighed, and then mixed using a stainless-steel spoon. If not aliquoted immediately, homogenized samples must be stored in clean HDPE containers and stored frozen for subsequent use.

If using a meat grinder, chilling it by briefly grinding a few pellets of dry ice may keep the tissue from sticking to the equipment. Pellets of dry ice also may be added to the tissue as it enters the grinder. After the entire sample has been processed, mix the ground tissue with a spoon, transfer back to the grinder, and repeat the grinding at least two more times until the homogenized tissue has a consistent texture and color. Between samples, disassemble the grinder or maceration device, remove any remaining tissue, and wash all parts with PFAS-free detergents, rinse with tap water, then reagent water, and finally methanol. Do not bake the grinder parts.

Once during the preparation of each batch of tissue samples (up to 20), prepare an equipment blank by pouring 500 mL of reagent water through the reassembled grinder and collecting the rinsate in a 500-mL HDPE container. Process that rinsate as an aqueous sample but record the result in nanograms (ng) of each analyte. Barring other project-specific requirements, assess the levels of any PFAS in the rinsate by assuming that the entire mass of the analyte in the rinsate was transferred to the smallest mass of any bulk tissue sample that was collected during the grinding process (not the 2-g aliquot taken for analysis below). For example, if the smallest fish sample in the batch yields 500 g of ground tissue, divide the mass of each target analyte in the rinsate by 500, and compare those amounts to the MDLs for tissue samples.

11.4.1 For each sample, weigh a 2-g aliquot of homogenized tissue into a 15-mL polypropylene centrifuge tube. Reseal the container with the remaining homogenized portion of the sample and return it to frozen storage in the event that it needs to be used for reanalysis.

Note: *The default sample weight for tissue is 2 g wet weight; however, a 1-g sample may be used. Higher sample weights are not recommended for this method.*

11.4.2 Prepare the batch QC samples using 2 g of reference tissue matrix (Section 7.2.3) for the method blank and two OPRs. Spike one OPR sample with the native standards solution (Section 7.3.3) at 2x the LOQ (LLOPR). This aliquot will serve to verify the LOQ. Spike the other OPR sample at the concentration of the mid-level calibration point. This aliquot will serve as the traditional OPR.

Note: *If matrix spikes are required for a specific project, spike the field sample aliquots designated as MS/MSD samples with the native standards solution (Section 7.3.3) at concentrations roughly 3 to 5 times the background concentration determined during screening of the unspiked sample, but not to exceed the calibration range. This may require multiple spiking solutions. If screening was not performed, then spike those samples at the concentration of the mid-level calibration point.*

11.4.3 Spike an aliquot of EIS solution (Section 7.3.1) directly into each field and QC sample. Vortex and allow to equilibrate for at least 30 minutes.

11.4.4 Add 10 mL of 0.05M KOH in methanol (Section 7.1.8) to each sample. Vortex to disperse the tissue then place tubes on a variable speed mixing table set at low speed to extract for at least 16 hours. Avoid violent shaking of the samples. Centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and collect the supernatant in a 50-mL polypropylene centrifuge tube.

11.4.5 Add 10 mL of acetonitrile to remaining tissue in the 15-mL centrifuge tube, vortex to mix and disperse the tissue. Sonicate for 30 minutes. Centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and collect the supernatant, adding it to the 50-mL centrifuge tube containing the initial extract.

11.4.6 Add 5 mL of 0.05M KOH in methanol (Section 7.1.8) to the remaining sample in each centrifuge tube. Vortex to disperse the tissue and hand mix briefly. Centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes and collect the supernatant, adding it to the 50-mL centrifuge tube containing the first two extracts.

11.4.7 Using a 10-mg scoop, add 10 mg of carbon (Section 7.1.17) to the combined extract, mix by occasional hand shaking over a period of 5 minutes and no more, then centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes. Immediately decant the extract into a 60-mL glass evaporation or concentrator tube.

11.4.8 Add 1 mL of reagent water to each evaporation/concentrator tube, set the evaporator/concentrator to 55 ºC with a N_2 flow of 1.2 L/min and concentrate the extract to 2.5 mL (only ~1 mL of the methanol should remain).

11.4.9 Add reagent water to each evaporation/concentrator tube to dilute the extracts to 50 mL. Check that the pH = 6.5 ± 0.5 and adjust as needed with 50% formic acid (Section 7.1.13.4) or ammonium hydroxide (or with 5% formic acid [Section 7.1.13.3] and 3% aqueous ammonium hydroxide [Section 7.1.6]). The extracts are ready for SPE and cleanup (Section 12.0).

12.0 Extraction, Cleanup, and Concentration

Samples of all matrices (and the associated batch QC) must undergo SPE and carbon cleanup to remove interferences (Section 12.1). Sample elution as well as any further extract treatment is matrix specific and may be found in Sections 12.2 through 12.4.

Note: *Carbon cleanup is required. Carbon cleanup may remove analytes if the sample has a very low organic carbon content (this is unusual for non-drinking water environmental samples). This will be apparent if the EIS recoveries are significantly higher on the reanalysis. However, if the laboratory can demonstrate that the carbon cleanup is detrimental to the analysis of samples from a particular source (by comparing results when skipping the carbon cleanup during reanalysis), then the carbon cleanup may be skipped for samples from that specific source, with client approval.*

12.1 All sample matrices

12.1.1 Pack clean silanized glass wool to half the height of the WAX SPE cartridge barrel (Section 6.7.1).

12.1.2 Set up the vacuum manifold with one WAX SPE cartridge plus a reservoir and reservoir adaptor for each cartridge for each sample and QC sample.

12.1.3 Pre-condition the cartridges by washing them with 15 mL of 1% methanolic ammonium hydroxide (Section 7.1.7.2), followed by 5 mL of 0.3M formic acid (Section 7.1.13.2) (do not use the vacuum for this step). Do not allow the WAX SPE to go dry. Discard the wash solvents.

12.1.4 Pour the sample into the reservoir (do not use a pipette), taking care to avoid splashing while loading. Adjust the vacuum and pass the sample through the cartridge at 5 mL/min. Retain the empty sample bottle and allow it to air dry for later rinsing (Section 12.2.2). Discard the eluate.

Note: *For aqueous samples, in the event the SPE cartridge clogs during sample loading, place a second pre-conditioned cartridge and continue loading the remaining sample aliquot using the same reservoir. Proceed to Section 12.1.5.*

12.1.5 Rinse the walls of the reservoir with 5 mL reagent water (twice) followed by 5 mL of 1:1 0.1M formic acid/methanol (Section 7.1.13.5) and pass those rinses through the cartridge using vacuum. Dry the cartridge by pulling air through for 15 seconds. Discard the rinse solution. Continue to the elution steps based on the matrix (see Section 12.2 – Aqueous, Section 12.3 – Solids, and Section 12.4 – Tissue).

12.2 Elution of aqueous samples

Note: *If two cartridges were used, perform the steps in Sections 12.2.1 through 12.2.3 with each cartridge. Filter the eluates through a 25-mm, 0.2-µm syringe filter. Combine both sets of filtered eluates into a clean tube, add the NIS solution, and vortex to mix. Transfer 350 µL of the filtered extract into a 1-mL polypropylene microvial and mark the level. Add another 350-µL portion and using a gentle stream of nitrogen (water bath at 40 ºC), concentrate to the 350-µL mark and submit for LC-MS/MS analysis. This concentration step is only applicable to situations where two SPE cartridges were eluted, each with 5 mL of elution solvent.*

12.2.1 Place clean collection tubes (13 x 100 mm polypropylene) inside the manifold, ensuring that the extract delivery needles do not touch the walls of the tubes. DO NOT add the NIS solution to these collection tubes.

12.2.2 Rinse the inside of the sample bottle with 5 mL of 1% methanolic ammonium hydroxide (Section 7.1.7.2), then, using a glass pipette, transfer the rinse to the SPE reservoir, washing the walls of the reservoir. Use vacuum to pull the elution solvent through the cartridge and into the collection tubes.

Note: *Air dry the empty sample bottle after the rinse is transferred. Weigh the empty bottle with the cap on and subtract from the weight with the sample determined in Section 11.2.2.*

12.2.3 Add 25 µL of concentrated acetic acid to each sample extract in the collection tubes and vortex to mix. Add 10 mg of carbon (Section 7.1.17) to each sample extract and batch QC sample extract, using a 10-mg scoop. Hand-shake occasionally for 5 minutes and no more. It is important to minimize the time the extract is in contact with the carbon. Immediately vortex (30 seconds) and centrifuge at 1400 RCF (e.g., 2800 rpm for the centrifuge listed in Section 6.5) for 10 minutes (other rotational speeds may be used for centrifuges other than the one described in Section 6.5.1).

Note: *The use of two stacked SPE cartridges, the first containing the WAX sorbent and the second containing activated carbon, or other cartridge configurations may be employed in place of the use of the loose carbon described above.* ***However, each laboratory seeking to apply such an approach must document their specific approach and demonstrate its effectiveness in meeting the QC specifications of this method, as described in Sec. 9.1.2.***

12.2.4 Add an aliquot of the NIS solution (Section 7.3.2) to a clean collection tube. Place a syringe filter (25-mm filter, 0.2-µm nylon membrane) on a 5-mL polypropylene syringe. Take the plunger out and carefully decant the sample supernatant into the syringe barrel. Replace the plunger and filter the entire extract into the new collection tube containing the NIS solution. Vortex to mix and transfer a portion of the extract into a 1-mL polypropylene microvial for LC-MS/MS analysis. Cap the collection tube containing the remaining extract and store at or below 6 °C.

12.3 Elution of solid samples

12.3.1 Add NIS solution (Section 7.3.2) to a clean collection tube (13 x 100 mm polypropylene) for each sample and QC aliquot and place them into the manifold rack, ensuring the extract delivery needles are not touching the walls of the tubes.

12.3.2 Rinse the inside of the evaporation/concentrator tube using 5 mL of 1% methanolic ammonium hydroxide (Section 7.1.7.2), then, using a glass pipette, transfer the rinse to the reservoir, washing the walls of the reservoir. Use the vacuum to pull the elution solvent through the cartridge and into the collection tubes.

12.3.3 Add 25 µL of concentrated acetic acid to each sample extract in its collection tube and swirl to mix. Place a syringe filter (25-mm filter, 0.2-µm nylon membrane) on a 5 mL polypropylene syringe. Take the plunger out and carefully decant ~1 mL of extract into the syringe barrel. Replace the plunger and filter into a 1-mL polypropylene microvial for LC-MS/MS analysis. Cap the collection tube containing the remaining extract and store at 0 - 6 °C.

12.4 Elution of tissue samples

12.4.1 Add NIS solution (Section 7.3.2) to clean collection tubes (13 x 100 mm, polypropylene) for each sample and QC aliquot. Place the tubes into the manifold rack and ensure the extract delivery needles are not touching the walls of the tubes.

12.4.2 Rinse the inside of the evaporation/concentrator tube using 5 mL of 1% methanolic ammonium hydroxide (Section 7.1.7.2), then, using a glass pipette, transfer the rinse to the reservoir, washing the walls of the reservoir. Use the vacuum to pull the elution solvent through the cartridge and into the collection tubes.

12.4.3 Add 25 µL of concentrated acetic acid to each sample extract. Place a syringe filter (25-mm filter, 0.2-µm nylon membrane) on a 5-mL polypropylene syringe. Take the plunger out and carefully decant an aliquot (~1 mL) of the extract into the syringe barrel. Replace the plunger and filter into a 1-mL polypropylene microvial for LC-MS/MS analysis. Cap the collection tube containing the remaining extract and store at or below 6 °C (see Section 8.5.5).

13.0 Instrumental Analysis

Analysis of sample extracts for PFAS by LC-MS/MS is performed on an ultrahigh performance liquid chromatograph coupled to a triple quadrupole mass spectrometer, running manufacturer's software. The mass spectrometer is run with unit mass resolution in the multiple reaction monitoring (MRM) mode.

13.1 Perform mass calibration, including mass calibration verification (Section 10.1), establish the operating conditions (Section 10.2), and perform an initial calibration (Section 10.3) at the frequencies described in those sections prior to analyzing samples.

13.2 Only after all performance criteria in Sections 10.1, 10.2, and 10.3 are met may blanks, MDLs, IPRs/OPRs, and samples be analyzed.

13.3 After a successful initial calibration has been completed, the analytical sequence for a batch of samples analyzed during the same time period is as follows. The volume injected for samples and QC samples must be identical to the volume used for calibration (Section 10.3.2). Standards and sample extracts **must** be brought to room temperature and vortexed prior to aliquoting into an instrument vial in order to ensure homogeneity of the extract.

1. Instrument Blank
2. Instrument Sensitivity Check (see Section 7.3.4)
3. Calibration Verification Standard
4. Qualitative Identification Standards
5. Instrument Blank
6. Method Blank
7. Low-level OPR (LLOPR)
8. OPR
9. Bile salt interference check standard (Section 7.5)
10. Injections of sample extracts, diluted extracts, and QC sample extracts (10 or fewer field sample extracts)
11. Calibration Verification Standard
12. Instrument Blank
13. Injections (10 or fewer field sample extracts)

14. Calibration Verification Standard
15. Instrument Blank

If the results are acceptable, the closing calibration verification solution (#14 above) may be used as the opening solution for the next analytical sequence.

13.4 If the response exceeds the calibration range for any target analyte, the sample extract is diluted as per Section 15.3 to bring those target analyte responses within the calibration range.

Note: *If the analytes that exceed the calibration range in the original analysis are known to **not** be of concern for the specific project (e.g., are **not** listed in a discharge permit), then the laboratory may consult with the client regarding the possibility of reporting sample results over the calibration range from the undiluted analysis, provided that they are clearly identified as such and appropriately qualified.*

14.0 Performance Tests during Routine Operations

The following performance tests must be successfully completed as part of each routine instrumental analysis sequence described in Section 13.3 above (also see Table 11).

14.1 Instrument sensitivity check

The signal-to-noise ratio of the ISC standard (Section 7.3.4) must be greater than or equal to 3:1 for the quantitation and confirmation ions that exist and must meet the ion ratio requirements in Section 15.1.3. If the analyte has no confirmation ions, then a 10:1 signal to noise ratio is required. If the requirements cannot be met, the problem must be corrected before analyses can proceed. In addition, the measured concentration of each target analyte in the ISC must fall within ± 30% of its nominal concentration. If that requirement cannot be met for any target analyte relevant to a project, analysis must be halted, and the sensitivity of the LC-MS/MS system adjusted before analysis of field or QC samples.

14.2 Bile salt interference check

The retention time of the bile salts in the standard in Section 7.5 must fall at least one minute outside the retention time window for any of the linear or branched PFOS isomers in the standard described in Section 7.3.3. If this requirement is not met, the chromatographic conditions must be adjusted to meet the requirement and the initial calibration must be repeated before any field sample are analyzed.

14.3 Calibration verification (CV)

After a passing instrument sensitivity check (Section 14.1) and a successful initial calibration (Section 10.3.3.3) are achieved, prior to the analysis of any samples, analyze a mid-level calibration standard (Section 7.3.4).

14.3.1 The calibration is verified by analyzing a CV standard at the beginning of each analytical sequence, every ten samples or less, and at the end of the analytical sequence.

14.3.2 Calculate concentration for each target analyte and EIS compound in the CV using the equation in Section 15.2.

14.3.3 The recovery of target analyte for the CVs must be within 70 - 130% unless the analyte is not of concern for a given project.

14.3.4 If the CV criterion in Section 14.3.3 is not met, take corrective action and reanalyze any extracts that were analyzed between the last passing CV and the one that failed. However, if an analyte in the CV failed because of high recovery, but that analyte was not detected in a sample extract associate with that failure, then that sample extract need not be reanalyzed. In some instances, the laboratory may need to recalibrate the LC-MS/MS instrument according to Section 10.3.

14.3.5 Ion abundance ratios

Using the data from the CV standard, compute the ion abundance ratio (IAR) for each target analyte listed with a confirmation ion mass in Table 10, using the equation below. These ion abundance ratios will be used a part of the qualitative identification criteria in Section 15.1.

$$IAR = \frac{Area_{Q1}}{Area_{Q2}}$$

where:

IAR = Ion abundance ratio

$Area_{Q1}$ = Measured area of the Q1 m/z for the analyte in the mid-point calibration standard or initial CV standard, depending on the analyte concentration, as described in Section 15.1.3

$Area_{Q2}$ = Measured area of the Q2 m/z for the analyte in the mid-point calibration standard or initial CV standard, depending on the analyte concentration, as described in Section 15.1.3

Note: *Some of the target analytes in Table 10 do not produce confirmation ions or produce confirmation ions with very low relative abundances; therefore, for those analytes, the IAR does not apply.*

Construct an acceptance window for the IAR of each target analyte as 50% to 150% of the IAR in the mid-point calibration standard or the CV standard at the beginning of the analytical sequence, as applicable, per Section 15.1.3.

14.4 Retention times and resolution

14.4.1 For all target analytes with exact corresponding isotopically labeled analogs, target analytes must elute within ± 0.1 minutes of the associated EIS compound.

14.4.2 The retention times of each target analyte and isotopically labeled compound must be within ± 0.4 minutes of the ICAL or CV used to establish the RT windows.

14.5 Ongoing precision and recovery (OPR)

14.5.1 After completing the first 6 steps in the analytical sequence described in Section 13.3, analyze the extracts of the low-level OPR (LLOPR) and the mid-level OPR) (Sections 11.2.3, 11.3.2, and 11.4.2) prior to analysis of samples from the same batch to ensure the analytical process is under control.

14.5.2 Compute the percent recovery of the native compounds. Compute the percent recovery of each EIS compound.

$$Recovery\ (\%) = \frac{Concentration\ found\ (ng/mL)}{Concentration\ spiked\ (ng/mL)} \times 100$$

14.5.3 For the target analytes and EIS compounds, compare the recovery to the OPR and LLOPR limits given in Tables 5, 6, 7, and 8. OPR, LLOPR, and EIS results must meet the acceptance criteria in these tables. If all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and aqueous samples may proceed. If, however, any individual concentration falls outside of the given range, the extraction/concentration processes are not being performed properly for that compound. In this event, correct the problem, re-prepare, extract, and clean up the sample batch, including any QC samples, and repeat the ongoing precision and recovery test.

14.6 Instrument blank – At the beginning of the analytical sequence and after the analysis of high concentration samples and standards (e.g., highest calibration standard, CV), analyze an instrument blank to ensure no instrument contamination has occurred. The instrument blank must not contain any target analyte that would yield a response equivalent to the mass of the analyte that would be present in a whole-volume sample at or above the analyte's MDL. If an analyte is present at such levels, analyze one or more additional instrument blanks until the response of the analyte is no longer detectable, or perform additional troubleshooting steps to identify and minimize other potential sources of PFAS contamination.

14.7 Method blank – After the analysis of the solvent blank and prior to the analysis of samples, analyze a method blank (Section 9.5).

14.8 Qualitative identification standard – Analyze a qualitative identification standard (Section 7.3.5) containing all available isomers (branched and linear) once at the beginning of the analytical sequence, to confirm the retention time of each linear and known branched isomer or isomer group.

14.9 Instrument sensitivity

Calculate the ratio of the NIS peak areas from the QC and field samples relative to the mean area of the corresponding NIS in the most recent initial calibration to check for possible bad injections of NIS solution or loss of instrument sensitivity.

$$Area\ Ratio_{NIS_i}(\%) = 100\ \times \frac{Area\ of\ NIS_i\ in\ the\ Sample}{Mean\ Area_{NIS_i}} \times\ DF$$

where:

Area of NIS_i in the Sample = Observed area counts for NIS_i in the sample

Mean $Area_{NISi}$ = The mean area counts for the corresponding NIS from the most recent initial calibration, calculated as described in Section 10.3.3.4

i = Indicates each of the seven NIS compounds listed in Table 1

DF = Any dilution factor applied to the extract. If no dilution was performed, then DF=1.

The NIS areas in the field samples and QC samples must be within 50 to 200% of the mean area of the corresponding NIS in the most recent initial calibration (i.e., a factor of 2). If the areas are low for all the field samples and QC samples in the batch, it suggests a loss of instrument sensitivity, while low areas in only some field or QC samples suggests a possible bad injection.

15.0 Data Analysis and Calculations

15.1 Qualitative peak identification

A native or isotopically labeled compound is qualitatively identified in a standard, blank, sample, or QC sample when all of the criteria in Sections 15.1.1 through 15.1.4 are met.

15.1.1 For target analytes or EIS compounds to be identified, peak responses of the quantitation and confirmation ions must be at least three times the background noise level (S/N 3:1). The quantitation ion must have a S/N ≥ 10:1 if there is no confirmation ion. If the S/N ratio is not met due to high background noise, the laboratory must correct the issue (e.g., perform instrument troubleshooting and any necessary maintenance, such as cleaning the ion source, replacing the LC column, or if needed, repeat the cleanup steps to remove background due to the sample matrix). If the S/N ratio is not met but the background is low, then the analyte is to be considered a non-detect.

15.1.2 Target analyte, EIS compound, and NIS compound RTs must fall within ± 0.4 minutes of their predicted retention times from the midpoint standard of the ICAL or initial CV, whichever was used to establish the RT window position for the analytical batch. The retention time window used must be of sufficient width to detect earlier-eluting branched isomers. For all target analytes with exact corresponding isotopically labeled analogs, target analytes must elute within ± 0.1 minutes of the associated EIS.

15.1.3 The laboratory must follow the identification requirements specified by the client for the project. In the event there are no project-specific requirements, the following general requirements apply. For concentrations at or above the LOQ, the IAR must fall within ± 50% of the IAR observed in the mid-point initial calibration standard. If project-specific requirements involve reporting sample concentrations below the LOQ, the IAR must fall within ± 50% of the IAR observed in either the mid-point initial calibration standard or the initial CV (see Section 14.3.5 for applicability).

The total response of all isomers (branched and linear) in the quantitative standards must be used to define the IAR. In samples, the total response should include only the branched isomer peaks that have been identified in either the quantitative or qualitative standard (see Section 7.3 regarding records of traceability of all standards). If standards (either quantitative or qualitative) are not available for purchase, only the linear isomer can be identified and quantitated in samples. The ratio requirement does not apply to PFBA, PFPeA, NMeFOSE, NEtFOSE, PFMPA, or PFMBA because secondary transitions (Q2) for these analytes are either not detectable or have inadequate S/N to be reliable for routine use in an ion ratio calculation.

15.1.4 If the field sample result does not all meet the criteria stated in Sections 15.1.1 through 15.1.3, and all sample preparation avenues (e.g., extract cleanup, sample dilution, etc.) have been exhausted, the result may only be reported with a data qualifier alerting the data user that the result could not be confirmed because it did not meet the method-required criteria and therefore should be considered a tentative identification and an estimated value. If the criteria listed above are not met for the standards, the laboratory must stop analysis of samples and correct the issue.

15.2 Quantitative determination

Concentrations of the target analytes are determined with respect to the extracted internal standard (EIS) which is added to the sample prior to extraction. The EIS is quantitated with respect to a non-extracted internal standard (NIS), as shown in Table 10, using the response ratios or response factors from the most recent multi-level initial calibration (Section 10.3). Other equations may be used if the laboratory demonstrates that those equations produce the same numerical result as produced by the equations below.

For the target analytes:

$$Concentration\ (ng/L\ or\ ng/g) = \frac{Area_t\ M_{EIS}}{Area_{EIS}(\overline{RR}\ or\ \overline{RF})} \times DF \times \frac{1}{W_S} \times \frac{1}{\%\ solids}$$

where:

$Area_t$ = Measured area of the Q1 m/z for the target analyte
$Area_{EIS}$ = Measured area at the Q1 m/z for the EIS. *See note below.*
M_{EIS} = Mass of the EIS added (ng)
$\overline{RR}$ = Average response ratio used to quantify target analytes by the isotope dilution method
$\overline{RF}$ = Average response factor used to quantify target analytes by the extracted internal standard method
DF = Dilution factor. If no dilution was performed, then DF=1.
W_S = Sample volume (L) or wet weight (g)
% solids = As determined in Section 11.1.2. Only applies to soil, sediment, and biosolid samples, but *not* tissue samples

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Note: *For better accuracy, the EPA recommends that PFTrDA be quantified using the average of the areas of labeled compounds $^{13}C_2$-PFTeDA and $^{13}C_2$-PFDoA.*

And for the EIS compounds:

$$Concentration\ (ng/L\ or\ ng/g) = \frac{Area_{EIS}\ M_{NIS}}{Area_{NIS}\overline{RF_s}} \times DF\ \times \frac{1}{W_S}$$

where:

$Area_{EIS}$ = Measured area at the Q1 m/z for the EIS
$Area_{NIS}$ = Measured area of the Q1 m/z for the NIS
M_{NIS} = Mass of the NIS added (ng)
DF = Dilution factor. If no dilution was performed, then DF=1.
W_S = Sample volume (L) or weight (g)
$\overline{RF_s}$ = Average response factor used to quantify the EIS by the non-extracted internal standard method

Results for target analytes are recovery corrected by the method of quantification. EIS recoveries are determined against the NIS and are used as general indicators of overall analytical quality. The NIS has no impact on the target analyte result.

The instrument measures the target analytes as either their anions or neutral forms. **The default approach for Clean Water Act uses of the method is to report the analytes in their acid or neutral forms,** using the following equation to convert the concentrations:

$$C_{Acid} = C_{Anion} \times \frac{MW_{Acid}}{MW_{Anion}}$$

where:

C_{Anion} = Analyte concentration in anion form

MW_{Acid} = Molecular weight of the acid form
MW_{Anion} = Molecular weight of the anion form

15.3 Sample dilutions

15.3.1 If the Q1 area for any compound exceeds the calibration range of the system, dilute a subsample of the sample extract with the methanolic ammonium hydroxide and acetic acid solution in Section 7.1.9 and analyze the diluted extract for the analyte(s) that exceeded the calibration range. If the responses for any EIS in the diluted extract that is associated with one of those analytes meet the S/N and retention time requirements in Sections 15.1.1 and 15.1.2, and the EIS recoveries from the analysis of the diluted extract meet the requirements in Tables 6 and 8, then the compounds associated with those EIS compounds may be quantified using the EIS response. Adjust the compound concentrations, detection limits, minimum levels, and LOQs to account for the dilution.

If the EIS responses in the diluted extract do not meet those S/N and retention time requirements, then the compound cannot be measured reliably by isotope dilution in the diluted extract. In such cases, the laboratory must take a smaller aliquot of any affected aqueous sample and dilute it to 500 mL with reagent water and prepare and analyze the diluted aqueous sample, or prepare and analyze a smaller aliquot of soil, biosolid, sediment, or tissue sample. Adjust the calibration ranges, detection limits, and LOQs to account for the tested sample mass/volume and any dilution factors.

Note: *If the EIS recovery does not meet the requirements of Tables 6 and 8, but has a S/N greater than or equal to 20:1, the result may have some utility as an estimated value. Some non-NPDES projects may accept such an estimated value if the result is so high that it is well above the project criteria or action level, especially if additional sampling is planned for that site.*

15.3.2 If the recovery of any EIS in a sample is outside of the acceptance limits in Tables 6 or 8 and any of the associated target analytes are detected, then a diluted sample extract must be analyzed, or a smaller sample mass/volume must be extracted (Section 15.3.1). If all cleanup procedures in this method are used and EIS recovery remains outside of the acceptance range, extraction and/or cleanup procedures that are beyond this scope of this method may be needed to analyze the sample. However, if the target analytes associated with an EIS with recovery above the limits in Tables 6 or 8 are *not* detected in the sample, then analysis of a diluted sample or extraction of a smaller sample mass/volume is not required.

15.4 Reporting of analytical results (acid/neutral forms)

The data reporting practices described here are focused on Clean Water Act National Pollutant Discharge Elimination System monitoring needs and may not be relevant to other uses of the method. For analytes reported in their acid form, use the equations in Section 15.2 and the analyte names or abbreviations in Table 1. For analytes reported in their anion form, see Table 2 for the appropriate names, abbreviations, and CAS Registry Numbers.

15.4.1 Report results for aqueous samples in ng/L. Report results for solid samples in ng/g, on a dry-weight basis, and report the percent solids for each sample separately. Report results for tissue samples in ng/g, on a wet-weight basis. Other units may be used if required in a permit or for a project. Report all QC data with the sample results.

15.4.2 Reporting level

Unless specified otherwise by a regulatory authority or in a discharge permit, results for analytes that meet the identification criteria are reported down to the concentration of the LOQ established by the laboratory through calibration of the instrument (see the glossary for the derivation of the LOQ).

15.4.2.1 Report a result for each analyte in each field sample or QC standard at or above the laboratory's LOQ to 3 significant figures. Report a result for each analyte found in each field sample or QC standard below the LOQ as "<LOQ," where LOQ is the concentration of the analyte at the laboratory's LOQ, or as required by the regulatory/control authority or permit.

15.4.2.2 Report a result for each analyte in a blank at or above the MDL to 2 significant figures. Report a result for each analyte found in a blank below the MDL as "<MDL," where MDL is the concentration of the analyte at the MDL, or as required by the regulatory/control authority or permit.

15.4.2.3 Report a result for an analyte found in a sample at the least dilute level at which the area at the quantitation m/z is within the calibration range (e.g., above the LOQ for the analyte and below the highest calibration standard) and with isotopically labeled compound recoveries within their respective QC acceptance criteria. This may require reporting results for some analytes from different analyses.

15.4.2.4 Report recoveries of all associated EIS compounds for all field samples and QC standards. If a sample extract was diluted and analyzed, report the EIS compound recoveries from both the original analysis and the analysis of the dilution.

15.4.3 Results from tests performed with an analytical system that is not in control (i.e., that does not meet acceptance criteria for any QC tests in this method) must be documented and reported (e.g., with a qualifier on results), unless the failure is not required to be reported as determined by the regulatory/control authority. Results associated with a QC failure cannot be used to demonstrate Clean Water Act regulatory compliance. QC failures do not relieve a discharger or permittee of reporting timely results. If the holding time would be exceeded for a reanalysis of the sample, the regulatory/control authority should be consulted for disposition.

16.0 Method Performance

Initial method performance is validated through analysis of matrix-specific reference samples, including IPRs and MDLs. Ongoing method performance is monitored through QC samples analyzed alongside samples. The parameters monitored include percent recovery of isotopically labeled compounds, blank concentrations, and native compound recoveries.

This method has been validated, and performance specifications were developed using data from DoD's interlaboratory validation study (References 11- 14). Data from the QC samples in that study were used to develop the QC acceptance criteria in Tables 5 through 8. Table 9 provides the pooled MDL results and the range of LOQs from the multi-laboratory validation study as examples of the sensitivity of the

method, but as noted in the footnotes to that table, the MDLs and LOQs generated in each laboratory should be used for data reporting and data quality assessments.

17.0 Pollution Prevention

17.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Many opportunities for pollution prevention exist in laboratory operations. The EPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to minimize waste generation. When wastes cannot be reduced feasibly at the source, the EPA recommends recycling as the next best option.

17.2 The compounds in this method are used in extremely small amounts and pose little threat to the environment when managed properly. Standards should be prepared in volumes consistent with laboratory use to minimize the disposal of excess volumes of expired standards.

17.3 For information about pollution prevention that may be applied to laboratories and research institutions, consult *Less is Better: Laboratory Chemical Management for Waste Reduction* (Reference 7).

18.0 Waste Management

18.1 The laboratory is responsible for complying with all Federal, State, and local regulations governing waste management, particularly regarding management of hazardous waste, and to protect the air, water, and land by minimizing and controlling all releases from fume hoods and bench operations. Compliance also is required with any sewage discharge permits and regulations. An overview of requirements can be found in *Environmental Management Guide for Small Laboratories* (Reference 8).

18.2 Liquids, including aqueous samples, at pH < 2 or pH > 12.5 are hazardous and must be handled and disposed of as hazardous waste or neutralized and disposed of in accordance with all Federal, State, and local regulations

18.3 For further information on waste management, consult *The Waste Management Manual for Laboratory Personnel* and *Less is Better-Laboratory Chemical Management for Waste Reduction*, (Reference 9).

19.0 References

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20.0 Tables, Diagrams, Flowcharts, and Validation Data

Table 1. Names, Abbreviations, and CAS Registry Numbers for Target PFAS, Extracted Internal Standards, and Non-extracted Internal Standards[1]

Target Analyte Name	Abbreviation	CASRN
Perfluoroalkyl carboxylic acids		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl sulfonic acids		
Acid Form		
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentanesulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid *	PFDS	335-77-3
Perfluorododecanesulfonic acid *	PFDoS	79780-39-5
Fluorotelomer sulfonic acids		
1*H*,1*H*,2*H*,2*H*-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1*H*,1*H*,2*H*,2*H*-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1*H*,1*H*,2*H*,2*H*-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctane sulfonamides		
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols		
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Per- and Polyfluoroether carboxylic acids		
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	919005-14-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6

Table 1. Names, Abbreviations, and CAS Registry Numbers for Target PFAS, Extracted Internal Standards, and Non-extracted Internal Standards[1]

Target Analyte Name	Abbreviation	CASRN
Ether sulfonic acids		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid *	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7
Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4
EIS Compounds		
Perfluoro-n-[$^{13}C_4$]butanoic acid	$^{13}C_4$-PFBA	NA
Perfluoro-n-[$^{13}C_5$]pentanoic acid	$^{13}C_5$-PFPeA	
Perfluoro-n-[1,2,3,4,6-$^{13}C_5$]hexanoic acid	$^{13}C_5$-PFHxA	
Perfluoro-n-[1,2,3,4-$^{13}C_4$]heptanoic acid	$^{13}C_4$-PFHpA	
Perfluoro-n-[$^{13}C_8$]octanoic acid	$^{13}C_8$-PFOA	
Perfluoro-n-[$^{13}C_9$]nonanoic acid	$^{13}C_9$-PFNA	
Perfluoro-n-[1,2,3,4,5,6-$^{13}C_6$]decanoic acid	$^{13}C_6$-PFDA	
Perfluoro-n-[1,2,3,4,5,6,7-$^{13}C_7$]undecanoic acid	$^{13}C_7$-PFUnA	
Perfluoro-n-[1,2-$^{13}C_2$]dodecanoic acid	$^{13}C_2$-PFDoA	
Perfluoro-n-[1,2-$^{13}C_2$]tetradecanoic acid	$^{13}C_2$-PFTeDA	
Perfluoro-1-[2,3,4-$^{13}C_3$]butanesulfonic acid	$^{13}C_3$-PFBS	
Perfluoro-1-[1,2,3-$^{13}C_3$]hexanesulfonic acid	$^{13}C_3$-PFHxS	
Perfluoro-1-[$^{13}C_8$]octanesulfonic acid	$^{13}C_8$-PFOS	
Perfluoro-1-[$^{13}C_8$]octanesulfonamide	$^{13}C_8$-PFOSA	
N-methyl-d_3-perfluoro-1-octanesulfonamidoacetic acid	D_3-NMeFOSAA	
N-ethyl-d_5-perfluoro-1-octanesulfonamidoacetic acid	D_5-NEtFOSAA	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-$^{13}C_2$]hexane sulfonic acid	$^{13}C_2$-4:2FTS	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-$^{13}C_2$]octane sulfonic acid	$^{13}C_2$-6:2FTS	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-$^{13}C_2$]decane sulfonic acid	$^{13}C_2$-8:2FTS	
Tetrafluoro-2-heptafluoropropoxy-$^{13}C_3$-propanoic acid	$^{13}C_3$-HFPO-DA	
N-methyl-D_7-perfluorooctanesulfonamidoethanol	D_7-NMeFOSE	
N-ethyl-D_9-perfluorooctanesulfonamidoethanol	D_9-NEtFOSE	
N-ethyl-D_5-perfluoro-1-octanesulfonamide	D_5-NEtFOSA	
N-methyl-D_3-perfluoro-1-octanesulfonamide	D_3-NMeFOSA	
NIS Compounds		
Perfluoro-n-[2,3,4-$^{13}C_3$]butanoic acid	$^{13}C_3$-PFBA	NA
Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid	$^{13}C_4$-PFOA	
Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid	$^{13}C_2$-PFDA	
Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanesulfonic acid	$^{13}C_4$-PFOS	
Perfluoro-n-[1,2,3,4,5-$^{13}C_5$] nonanoic acid	$^{13}C_5$-PFNA	
Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid	$^{13}C_2$-PFHxA	
Perfluoro-1-hexane[$^{18}O_2$]sulfonic acid	$^{18}O_2$-PFHxS	

[1] The target analyte names are for the acid and neutral forms of the analytes. See Table 2 for the names and Chemical Abstract Service Registry Numbers (CASRN) of the corresponding anion forms, where applicable.

NA = Not assigned a CAS Registry Number

* These analytes may not perform as well as others in some matrices (see Section 1.6): PFDS, PFDoS, and 11CL-PF3OUdS in aqueous samples; PFDoS and 11CL-PF3OUdS in biosolid samples; and PFDoS in tissue samples.

Table 2. Cross-reference of Abbreviations, Analyte Names, and CAS Registry Numbers for the Acid and Anion Forms of the Perfluoroalkyl Carboxylates and Perfluoroalkyl Sulfonates

Perfluoroalkyl carboxylic acids/anions				
Abbreviation	**Acid Name**	**CASRN**	**Anion Name**	**CASRN**
PFBA	Perfluorobutanoic acid	375-22-4	Perfluorobutanoate	45048-62-2
PFPeA	Perfluoropentanoic acid	2706-90-3	Perfluoropentanoate	45167-47-3
PFHxA	Perfluorohexanoic acid	307-24-4	Perfluorohexanoate	92612-52-7
PFHpA	Perfluoroheptanoic acid	375-85-9	Perflluoroheptanoate	120885-29-2
PFOA	Perfluorooctanoic acid	335-67-1	Pefluorooctanoate	45285-51-6
PFNA	Perfluorononanoic acid	375-95-1	Perfluorononanoate	72007-68-2
PFDA	Perfluorodecanoic acid	335-76-2	Perfluorodecanoate	73829-36-4
PFUnA	Perfluoroundecanoic acid	2058-94-8	Perfluoroundecanoate	196859-54-8
PFDoA	Perfluorododecanoic acid	307-55-1	Perfluorododecanoate	171978-95-3
PFTrDA	Perfluorotridecanoic acid	72629-94-8	Perfluorotridecanoate	862374-87-6
PFTeDA	Perfluorotetradecanoic acid	376-06-7	Perfluorotetradecanoate	365971-87-5
Perfluoroalkyl sulfonic acids/anions				
PFBS	Perfluorobutanesulfonic acid	375-73-5	Perfluorobutane sulfonate	45187-15-3
PFPeS	Perfluoropentanesulfonic acid	2706-91-4	Perfluoropentane sulfonate	175905-36-9
PFHxS	Perfluorohexanesulfonic acid	355-46-4	Perfluorohexane sulfonate	108427-53-8
PFHpS	Perfluoroheptanesulfonic acid	375-92-8	Perfluoroheptane sulfonate	146689-46-5
PFOS	Perfluorooctanesulfonic acid	1763-23-1	Perfluorooctane sulfonate	45298-90-6
PFNS	Perfluorononanesulfonic acid	68259-12-1	Perfluorononane sulfonate	474511-07-4
PFDS	Perfluorodecanesulfonic acid	335-77-3	Perfluorodecane sulfonate	126105-34-8
PFDoS	Perfluorododecanesulfonic acid	79780-39-5	Perfluorododecane sulfonate	343629-43-6

CASRN = Chemical Abstracts Service Registry Number

Table 3. Nominal Masses of Spike Added to Samples or Extracts

Standard Type	Amount Added (ng)[1]
EIS	
$^{13}C_4$-PFBA	40
$^{13}C_5$-PFPeA	20
$^{13}C_5$-PFHxA	10
$^{13}C_4$-PFHpA	10
$^{13}C_8$-PFOA	10
$^{13}C_9$-PFNA	5
$^{13}C_6$-PFDA	5
$^{13}C_7$-PFUnA	5
$^{13}C_2$-PFDoA	5
$^{13}C_2$-PFTeDA	5
$^{13}C_3$-PFBS	10
$^{13}C_3$-PFHxS	10
$^{13}C_8$-PFOS	10
$^{13}C_2$-4:2FTS	20
$^{13}C_2$-6:2FTS	20
$^{13}C_2$-8:2FTS	20
$^{13}C_8$-PFOSA	10
D_3-NMeFOSA	10
D_5-NEtFOSA	10
D_3-NMeFOSAA	20
D_5-NEtFOSAA	20
D_7-NMeFOSE	100
D_9-NEtFOSE	100
$^{13}C_3$-HFPO-DA	40
NIS	
$^{13}C_3$-PFBA	20
$^{13}C_2$-PFHxA	10
$^{13}C_4$-PFOA	10
$^{13}C_5$-PFNA	5
$^{13}C_2$-PFDA	5
$^{18}O_2$-PFHxS	10
$^{13}C_4$-PFOS	10

[1] The EIS amounts added to the samples in this table reflect the masses of each EIS that are present in each of the calibration standards, and the relative ratios of the target analytes and their EIS compounds are critical to the use of isotope dilution quantitation.

Table 4. Example Calibration Solutions (ng/mL) Based on Those Used in the Method Validation Studies

Compound	CS1 (LOQ)	CS2	CS3	CS4 (CV[1])	CS5	CS6	CS7[2]
Perfluoroalkyl carboxylic acids							
PFBA	0.8	2	5	10	20	50	250
PFPeA	0.4	1	2.5	5	10	25	125
PFHxA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFUnA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTrDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTeDA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluoroalkyl sulfonic acids							
PFBS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFPeS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHxS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoS	0.2	0.5	1.25	2.5	5	12.5	62.5
Fluorotelomer sulfonic acids							
4:2FTS	0.8	2	5	10	20	50	NA
6:2FTS	0.8	2	5	10	20	50	NA
8:2FTS	0.8	2	5	10	20	50	NA
Perfluorooctane sulfonamides							
PFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NMeFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamidoacetic acids							
NMeFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamide ethanols							
NMeFOSE	2	5	12.5	25	50	125	625
NEtFOSE	2	5	12.5	25	50	125	625
Per- and polyfluoroether carboxylic acids							
HFPO-DA	0.8	2	5	10	20	50	250
ADONA	0.8	2	5	10	20	50	250
PFMPA	0.4	1	2.5	5	10	25	125
PFMBA	0.4	1	2.5	5	10	25	125
NFDHA	0.4	1	2.5	5	10	25	125
Ether sulfonic acids							
9Cl-PF3ONS	0.8	2	5	10	20	50	250
11Cl-PF3OUdS	0.8	2	5	10	20	50	250
PFEESA	0.4	1	2.5	5	10	25	125

Table 4. Example Calibration Solutions (ng/mL) Based on Those Used in the Method Validation Studies

Compound	CS1 (LOQ)	CS2	CS3	CS4 (CV[1])	CS5	CS6	CS7[2]
Fluorotelomer carboxylic acids							
3:3FTCA	1.0	2.5	6.26	12.5	25	62.4	312
5:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
7:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
EIS Compounds							
$^{13}C_4$-PFBA	10	10	10	10	10	10	10
$^{13}C_5$-PFPeA	5	5	5	5	5	5	5
$^{13}C_5$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_9$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_6$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_7$-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_3$-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_3$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_2$-4:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-6:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-8:2FTS	5	5	5	5	5	5	5
$^{13}C_8$-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSAA	5	5	5	5	5	5	5
D_5-NEtFOSAA	5	5	5	5	5	5	5
D_7-NMeFOSE	25	25	25	25	25	25	25
D_9-NEtFOSE	25	25	25	25	25	25	25
$^{13}C_3$-HFPO-DA	10	10	10	10	10	10	10
NIS Compounds							
$^{13}C_3$-PFBA	5	5	5	5	5	5	5
$^{13}C_2$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_5$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{18}O_2$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5

[1] This calibration point is used as the calibration verification (CV)

[2] A minimum of six contiguous calibrations standards is required for linear models and a minimum of seven calibration standards is required for second-order models. Other calibration ranges and standard concentrations may be employed, provided that the conditions in Sections 10.3, 10.3.2, and 10.3.3 are met.

Table 5. IPR/OPR/LLOPR Acceptance Limits for Target Analytes in Aqueous Matrices[1]

	IPR[2]		
Target Analyte	**Mean Recovery (%)**	**RSD (%)**	**OPR/LLOPR Recovery (%)[2]**
PFBA	70 - 135	21	70 - 140
PFPeA	70 - 135	23	65 - 135
PFHxA	70 - 135	24	70 - 145
PFHpA	70 - 135	28	70 - 150
PFOA	65 - 155	27	70 - 150
PFNA	70 - 140	28	70 - 150
PFDA	65 - 140	26	70 - 140
PFUnA	70 - 135	29	70 - 145
PFDoA	70 - 130	21	70 - 140
PFTrDA	60 - 145	29	65 - 140
PFTeDA	70 - 145	27	60 - 140
PFBS	70 - 140	23	60 - 145
PFPeS	70 - 135	25	65 - 140
PFHxS	70 - 135	27	65 - 145
PFHpS	70 - 140	30	70 - 150
PFOS	70 - 140	29	55 - 150
PFNS	70 - 135	29	65 - 145
PFDS	70 - 135	30	60 - 145
PFDoS	45 - 135	35	50 - 145
4:2FTS	70 - 135	27	70 - 145
6:2FTS	70 - 135	32	65 - 155
8:2FTS	70 - 140	33	60 - 150
PFOSA	70 - 135	22	70 - 145
NMeFOSA	70 - 135	30	60 - 150
NEtFOSA	70 - 130	26	65 - 145
NMeFOSAA	65 - 140	32	50 - 140
NEtFOSAA	70 - 135	28	70 - 145
NMeFOSE	70 - 135	29	70 - 145
NEtFOSE	70 - 130	21	70 - 135
HFPO-DA	70 - 135	23	70 - 140
ADONA	70 - 135	23	65 - 145
PFMPA	60 - 140	23	55 - 140
PFMBA	65 - 145	27	60 - 150
NFDHA	65 - 140	37	50 - 150
9Cl-PF3ONS	70 - 145	30	70 - 155
11Cl-PF3OUdS	50 - 150	35	55 - 160
PFEESA	70 - 135	25	70 - 140
3:3FTCA	70 - 130	23	65 - 130
5:3FTCA	70 - 130	24	70 - 135
7:3FTCA	55 - 130	34	50 - 145

[1] Limits apply to the IPR, OPR, and LLOPR analyses associated with all aqueous matrices, including wastewater, surface water, groundwater, and landfill leachates.

[2] The recovery and RSD limits apply to the target analyte results for IPR, OPR, and LLOPR samples associated with all aqueous matrices. Data were derived from the multi-laboratory validation study and are therefore the limits required for this method.

Table 6. Acceptance Limits for EIS and NIS Compounds in All Aqueous Matrices and Associated QC Samples		
	Aqueous Matrices Other Than Leachates[2]	Landfill Leachates[3]
EIS Compound[1]	Recovery (%)	Recovery (%)
$^{13}C_4$-PFBA	5[4] - 130	5[4] - 130
$^{13}C_5$-PFPeA	40 - 130	40 - 130
$^{13}C_5$-PFHxA	40 - 130	40 - 130
$^{13}C_4$-PFHpA	40 - 130	40 - 130
$^{13}C_8$-PFOA	40 - 130	40 - 130
$^{13}C_9$-PFNA	40 - 130	40 - 130
$^{13}C_6$-PFDA	40 - 130	40 - 130
$^{13}C_7$-PFUnA	30 - 130	40 - 130
$^{13}C_2$-PFDoA	10 - 130	35 – 130
$^{13}C_2$-PFTeDA	10 - 130	25 – 130
$^{13}C_3$-PFBS	40 - 135	40 - 130
$^{13}C_3$-PFHxS	40 - 130	40 - 130
$^{13}C_8$-PFOS	40 - 130	40 - 130
$^{13}C_2$-4:2FTS	40 - 200	40 – 220
$^{13}C_2$-6:2FTS	40 - 200	40 – 170
$^{13}C_2$-8:2FTS	40 - 300	40 – 145
$^{13}C_8$-PFOSA	40 - 130	40 – 130
D_3-NMeFOSA	10 - 130	40 – 130
D_5-NEtFOSA	10 - 130	35 - 130
D_3-NMeFOSAA	40 - 170	35 - 130
D_5-NEtFOSAA	25 - 135	30 - 130
D_7-NMeFOSE	10 - 130	20 - 130
D_9-NEtFOSE	10 - 130	20 - 130
$^{13}C_3$-HFPO-DA	40 - 130	40 - 130
$^{13}C_3$-PFBA	50 - 200	50 - 200
$^{13}C_2$-PFHxA		
$^{13}C_4$-PFOA		
$^{13}C_5$-PFNA		
$^{13}C_2$-PFDA		
$^{18}O_2$-PFHxS		
$^{13}C_4$-PFOS		

[1] The recovery limits for the EIS compounds were derived by the EPA from the data from multi-laboratory validation study. To simplify laboratory operations, The EPA has applied the same EIS recovery limits used for field sample analyses to the EIS recoveries in the method blank, IPR, OPR, and LLOPR samples. There are no IPR mean or RSD criteria for the EIS compounds.

[2] Limits apply to the EIS and NIS recoveries from samples of aqueous matrices, including wastewater, surface water, and groundwater, but **not** landfill leachates.

[3] Limits apply to the EIS and NIS recoveries from samples of landfill leachates, **not** other aqueous matrices.

[4] Recovery of $^{13}C_4$-PFBA can be problematic in some field samples. Although the lower limit for recovery for this EIS is set below 10%, laboratories should routinely track recovery of this EIS and take reasonable steps to ensure that recovery is at least 10% in the majority of samples.

Table 7. IPR/OPR/LLOPR Acceptance Limits for Target Analytes in Solid, Biosolid, and Tissue Matrices

Compound	Solid and Biosolid Matrices[1]			Tissue Matrix[1]		
	IPR			IPR		
	Mean Recovery (%)	RSD (%)	OPR/LLOPR Recovery (%)	Mean Recovery (%)	RSD (%)	OPR/LLOPR Recovery (%)
PFBA	70 - 140	17	70 - 140	70 - 135	20	60 - 140
PFPeA	70 - 140	26	60 - 150	70 - 130	20	60 - 145
PFHxA	70 - 135	23	65 - 140	70 - 140	20	60 - 160
PFHpA	70 - 140	21	65 - 145	70 - 140	20	60 - 145
PFOA	70 - 140	23	70 - 150	70 - 130	25	60 - 150
PFNA	65 - 145	24	70 - 155	70 - 140	20	60 - 145
PFDA	70 - 145	26	70 - 155	70 - 135	20	60 - 150
PFUnA	70 - 145	26	70 - 155	70 - 135	20	60 - 155
PFDoA	70 - 145	25	70 - 150	70 - 135	20	60 - 140
PFTrDA	55 - 160	26	65 - 150	55 - 160	20	60 - 150
PFTeDA	70 - 145	24	65 - 150	70 - 140	25	60 - 140
PFBS	60 - 145	25	65 - 145	70 - 145	20	60 - 150
PFPeS	65 - 140	29	55 - 160	70 - 150	20	60 - 145
PFHxS	65 - 145	28	60 - 150	70 - 140	25	60 - 155
PFHpS	70 - 140	27	65 - 155	70 - 145	20	60 - 140
PFOS	70 - 135	27	65 - 160	70 - 135	30	60 - 160
PFNS	70 - 140	27	55 - 140	60 - 130	20	45 - 140
PFDS	50 - 150	31	40 - 155	55 - 135	20	50 - 140
PFDoS	40 - 140	40	25 - 160	25 - 145	45	25 - 140
4:2FTS	70 - 135	27	60 - 150	65 - 140	30	55 - 150
6:2FTS	60 - 160	50	55 - 200	70 - 140	25	60 - 150
8:2FTS	70 - 140	27	70 - 150	70 - 150	25	60 - 170
PFOSA	70 - 140	19	70 - 140	70 - 140	20	60 - 150
NMeFOSA	65 - 145	26	70 - 155	70 - 140	30	60 - 160
NEtFOSA	70 - 135	19	70 - 140	70 - 140	40	60 - 150
NMeFOSAA	65 - 145	31	65 - 155	70 - 140	20	60 - 145
NEtFOSAA	60 - 150	31	65 - 165	70 - 140	25	60 - 145
NMeFOSE	70 - 140	19	70 - 140	60 - 150	20	40 - 180
NEtFOSE	70 - 135	17	70 - 135	70 - 145	40	60 - 205
HFPO-DA	70 - 140	25	70 - 145	70 - 140	25	60 - 145
ADONA	70 - 155	26	70 - 160	70 - 145	20	55 - 165
PFMPA	70 - 140	25	30 - 140	70 - 145	40	25 - 145
PFMBA	55 - 145	33	60 - 150	70 - 140	20	60 - 150
NFDHA	45 - 145	27	60 - 155	70 - 155	30	60 - 180
9Cl-PF3ONS	65 - 135	23	70 - 150	70 - 140	20	60 - 170
11Cl-PF3OUdS	50 - 135	31	45 - 160	65 - 140	20	50 - 170
PFEESA	70 - 140	20	70 - 140	70 - 145	25	50 - 150
3:3FTCA	45 - 155	32	45 - 130	55 - 130	25	30 - 140
5:3FTCA	70 - 135	28	60 - 130	70 - 145	20	60 - 160
7:3FTCA	70 - 145	39	60 - 150	70 - 155	20	60 - 200

[1] The recovery limits apply to the target analyte results for IPR, OPR, and LLOPR samples for solid, biosolids, and tissue matrices. Data were derived from the multi-laboratory validation study and are therefore the limits required for this method.

Table 8. Acceptance Limits for EIS and NIS Compounds in Soil-Sediment, Tissue, and Biosolid Matrices and Associated QC Samples			
	Soil/Sediment Samples[2]	Tissue Samples[2]	Biosolid Samples[2]
EIS Compound[1]	Recovery (%)	Recovery (%)	Recovery (%)
$^{13}C_4$-PFBA	8[3] - 130	5[3] - 130	5[3] - 130
$^{13}C_5$-PFPeA	35 - 130	10 - 185	35 - 130
$^{13}C_5$-PFHxA	40 - 130	25 - 170	40 – 130
$^{13}C_4$-PFHpA	40 - 130	25 - 150	40 – 130
$^{13}C_8$-PFOA	40 - 130	25 - 150	40 – 130
$^{13}C_9$-PFNA	40 - 130	35 - 185	40 – 145
$^{13}C_6$-PFDA	40 - 130	30 - 150	40 – 130
$^{13}C_7$-PFUnA	40 - 130	30 - 180	40 – 130
$^{13}C_2$-PFDoA	40 - 130	35 - 180	40 – 130
$^{13}C_2$-PFTeDA	20 - 130	20 - 160	10 - 160
$^{13}C_3$-PFBS	40 - 135	25 - 190	40 - 150
$^{13}C_3$-PFHxS	40 - 130	35 - 175	40 - 140
$^{13}C_8$-PFOS	40 - 130	40 - 160	40 - 130
$^{13}C_2$-4:2FTS	40 - 165	30 - 300	40 - 300
$^{13}C_2$-6:2FTS	40 - 215	35 - 300	40 - 300
$^{13}C_2$-8:2FTS	40 - 275	40 - 365	40 - 300
$^{13}C_8$-PFOSA	40 - 130	25 - 180	20 - 140
D_3-NMeFOSA	10 - 130	5[4] - 130	20 - 130
D_5-NEtFOSA	10 - 130	5[4]- 130	20 - 130
D_3-NMeFOSAA	40 - 135	30 - 250	30 – 150
D_5-NEtFOSAA	40 - 150	30 - 235	20 - 140
D_7-NMeFOSE	20 - 130	5[4] - 160	25 - 130
D_9-NEtFOSE	15 - 130	5[4] - 130	20 - 130
$^{13}C_3$-HFPO-DA	40 - 130	20 - 185	40 - 130
$^{13}C_3$-PFBA	50 - 200	50 - 200	50 - 200
$^{13}C_2$-PFHxA			
$^{13}C_4$-PFOA			
$^{13}C_5$-PFNA			
$^{13}C_2$-PFDA			
$^{18}O_2$-PFHxS			
$^{13}C_4$-PFOS			

[1] Limits apply to the EIS and NIS recoveries from samples of all solid, biosolid, and tissue matrices.

[2] The recovery limits for the EIS compounds were derived by the EPA from the solid, tissue, and biosolids sample data from multi-laboratory validation study. To simplify laboratory operations, the EPA has applied the same EIS recovery limits used for field sample analyses to the EIS recoveries in the method blank, IPR, OPR, and LLOPR samples. There are no IPR mean or RSD criteria for the EIS compounds.

[3] Recovery of $^{13}C_4$-PFBA, can be problematic in some soil, tissue, and biosolids samples. Although the lower limits for recovery for these EISs are set below 10%, laboratories should routinely track recoveries of these EISs and take reasonable steps to ensure that recoveries are at least 10% in the majority of samples.

[4] Recoveries of D_3-NMeFOSA, D_5-NEtFOSA, D_7-NMeFOSE, and D_9-NEtFOSE can be problematic in tissue samples. The 5% the lower limit for recovery for these EISs may not be achievable for all laboratories in tissue samples. Any result associated with an EIS recovery below 5% should be considered estimated.

Table 9. Pooled MDL and Ranges of LOQ Values for Aqueous, Solid, and Tissue Matrices Demonstrated in the Method Validation Studies[1]

	Aqueous (ng/L)		Solid (ng/g)		Tissue (ng/g)	
Compound	Pooled MDL_s[2]	Range of LOQs[3]	Pooled MDL_s[2]	Range of LOQs[3]	Pooled MDL_s[2]	Range of LOQs[3]
PFBA	0.79	4 - 16	0.15	0.64 - 1.6	0.208	1.6 – 4.0
PFPeA	0.54	2 - 8	0.07	0.32 - 0.8	0.155	0.8 – 1.0
PFHxA	0.46	1 - 4	0.06	0.16 - 0.4	0.111	0.4 - 0.5
PFHpA	0.37	1 - 4	0.05	0.16 - 0.4	0.099	0.4 - 0.5
PFOA	0.54	1 - 4	0.07	0.16 - 0.4	0.105	0.4 - 0.5
PFNA	0.45	1 - 4	0.14	0.16 - 1.3	0.119	0.4 - 0.5
PFDA	0.52	1 - 4	0.06	0.16 - 0.4	0.149	0.4 - 0.5
PFUnA	0.45	1 - 4	0.12	0.16 - 0.5	0.125	0.4 – 1.0
PFDoA	0.40	1 - 4	0.06	0.16 - 0.4	0.101	0.4 - 0.5
PFTrDA	0.46	1 - 4	0.07	0.16 - 0.4	0.142	0.4 - 0.5
PFTeDA	0.49	1 - 4	0.05	0.16 - 0.4	0.159	0.4 – 1.0
PFBS	0.37	1 - 4	0.05	0.16 - 0.4	0.097	0.4 - 0.5
PFPeS	0.50	1 - 4	0.08	0.16 - 0.4	0.076	0.4 - 0.5
PFHxS	0.54	1 - 4	0.08	0.16 - 0.4	0.081	0.4 - 0.5
PFHpS	0.50	1 - 4	0.07	0.16 - 0.4	0.119	0.4 - 0.5
PFOS	0.63	1 - 4	0.07	0.16 - 0.4	0.145	0.4 – 2.0
PFNS	0.47	1 - 4	0.07	0.16 - 0.4	0.108	0.4 - 0.5
PFDS	0.60	1 - 4	0.08	0.16 - 0.4	0.114	0.4 - 0.5
PFDoS	0.60	1 - 4	0.06	0.16 - 0.4	0.153	0.4 - 0.5
4:2FTS	1.69	4 - 15	0.20	0.64 - 1.5	0.369	1.6 – 2.0
6:2FTS	2.45	4 - 15	0.39	0.64 - 1.5	0.537	1.6 – 2.0
8:2FTS	2.50	4 - 15	0.31	0.64 - 1.5	0.378	1.6 – 2.0
PFOSA	0.32	1 - 4	0.04	0.16 - 0.4	0.069	0.4 - 0.5
NMeFOSA	0.43	1 - 4	0.07	0.16 - 0.4	0.162	0.4 - 0.5
NEtFOSA	0.45	1 - 4	0.07	0.16 - 0.4	0.163	0.4 – 1.0
NMeFOSAA	0.68	1 - 4	0.08	0.16 - 0.4	0.145	0.4 - 0.5
NEtFOSAA	0.59	1 - 4	0.08	0.16 - 0.4	0.148	0.4 - 0.5
NMeFOSE	3.81	10 - 40	0.36	1.6 – 4.0	0.832	4.0 – 5.0
NEtFOSE	4.84	10 - 40	0.35	1.6 - 4.0	1.77	4.0 – 5.0
HFPO-DA	0.51	2 - 8	0.25	0.64 - 1.6	0.339	1.6 - 2.1
ADONA	0.50	2 - 8	0.23	0.64 - 1.5	0.274	1.6 – 2.0
PFMPA	1.46	4 - 16	0.07	0.32 - 0.8	0.273	0.8 – 2.0
PFMBA	1.41	4 - 15	0.05	0.32 - 0.8	0.168	0.8 – 1.0
NFDHA	0.75	2 - 7	0.20	0.32 - 0.8	0.216	0.8 – 1.0
9Cl-PF3ONS	1.38	4 - 15	0.22	0.64 - 1.5	0.362	1.6 – 2.0
11Cl-PF3OUdS	1.67	4 - 15	0.18	0.64 - 1.5	0.352	1.6 – 2.0
PFEESA	1.17	2 - 8	0.08	0.32 - 0.7	0.123	0.8 – 1.0
3:3FTCA	2.47	5 - 20	0.23	0.80 - 5.0	0.716	2.0 – 4.0
5:3FTCA	9.59	25 - 100	0.86	4 - 10	2.38	10 - 20
7:3FTCA	8.71	25 - 100	0.87	4 - 10	2.02	10 - 12.5

[1] MDLs and LOQs for landfill leachates and biosolids were not determined directly in the multi-laboratory validation study. Given the smaller sample sizes analyzed for leachates and biosolids, the MDLs and LOQs for leachates and biosolids are likely to be 5 and 10 times higher than for other aqueous samples and solid samples, respectively. Laboratories analyzing leachates and/or biosolids must determine their own MDLs and LOQs for those matrices.

[2] The pooled MDL_s values and are derived from the multi-laboratory validation study using MDL data from eight laboratories for aqueous matrices, from ten laboratories for solid matrices, from seven laboratories for tissue matrices. These pooled MDL_s values are estimates of the sensitivity that should be achievable in a well-prepared laboratory. The actual MDL values (either MDL_s or MDL_b) generated in each laboratory should be used for data reporting and data quality assessments.

[3] The ranges of LOQ values represent the observed LOQs in the multi-laboratory validation study using data from eight laboratories for the aqueous matrices, nine laboratories for the solid matrices, and seven laboratories for tissue matrices. The actual LOQs generated in each laboratory should be used for data reporting and data quality assessments.

Table 10. Analyte Ions Monitored, Extracted Internal Standard, and Non-extracted Internal Standard Used for Quantification

Abbreviation	Example Retention Time [1]	Parent Ion Mass	Quantification Ion Mass	Confirmation Ion Mass[2]	Typical Ion Ratio	Quantification Reference Compound
Target Analytes						
PFBA	1.96	213	169	NA	NA	$^{13}C_4$-PFBA
PFPeA	4.18	263	219	69	NA	$^{13}C_5$-PFPeA
PFHxA	4.81	313	269	119	13	$^{13}C_5$-PFHxA
PFHpA	5.32	363	319	169	3.5	$^{13}C_4$-PFHpA
PFOA	6.16	413	369	169	3.0	$^{13}C_8$-PFOA
PFNA	6.99	463	419	219	4.9	$^{13}C_9$-PFNA
PFDA	7.47	513	469	219	5.5	$^{13}C_6$-PFDA
PFUnA	7.81	563	519	269	6.9	$^{13}C_7$-PFUnA
PFDoA	8.13	613	569	319	10	$^{13}C_2$-PFDoA
PFTrDA[3]	8.53	663	619	169	6.7	avg.$^{13}C_2$-PFTeDA and$^{13}C_2$-PFDoA
PFTeDA	8.96	713	669	169	6.0	$^{13}C_2$-PFTeDA
PFBS	4.79	299	80	99	2.1	$^{13}C_3$-PFBS
PFPeS	5.38	349	80	99	1.8	$^{13}C_3$-PFHxS
PFHxS	6.31	399	80	99	1.9	$^{13}C_3$-PFHxS
PFHpS	7.11	449	80	99	1.7	$^{13}C_8$-PFOS
PFOS	7.59	499	80	99	2.3	$^{13}C_8$-PFOS
PFNS	7.92	549	80	99	1.9	$^{13}C_8$-PFOS
PFDS	8.28	599	80	99	1.9	$^{13}C_8$-PFOS
PFDoS	9.14	699	80	99	1.9	$^{13}C_8$-PFOS
4:2FTS	4.67	327	307	81	1.7	$^{13}C_2$-4:2FTS
6:2FTS	5.81	427	407	81	1.9	$^{13}C_2$-6:2FTS
8:2FTS	7.28	527	507	81	3.0	$^{13}C_2$-8:2FTS
PFOSA	8.41	498	78	478	47	$^{13}C_8$-PFOSA
NMeFOSA	9.70	512	219	169	0.66	D_3-NMeFOSA
NEtFOSA	9.94	526	219	169	0.63	D_5-NEtFOSA
NMeFOSAA	7.51	570	419	483	2.0	D_3-NMeFOSAA
NEtFOSAA	7.65	584	419	526	1.2	D_5-N-EtFOSAA
NMeFOSE	9.57	616	59	NA	NA	D_7-NMeFOSE
NEtFOSE	9.85	630	59	NA	NA	D_9-NEtFOSE
HFPO-DA	4.97	285	169	185	1.95	$^{13}C_3$-HFPO-DA
ADONA	5.79	377	251	85	2.8	$^{13}C_3$-HFPO-DA
PFMPA	3.21	229	85	NA	NA	$^{13}C_5$-PFPeA
PFMBA	4.53	279	85	NA	NA	$^{13}C_5$-PFPeA
NFDHA	4.84	295	201	85	1.46	$^{13}C_5$-PFHxA
9Cl-PF3ONS	7.82	531	351	533→353	3.2	$^{13}C_3$-HFPO-DA
11Cl-PF3OUdS	8.62	631	451	633→453	3.0	$^{13}C_3$-HFPO-DA
PFEESA	5.08	315	135	83	9.22	$^{13}C_5$-PFHxA
3:3FTCA	3.89	241	177	117	1.70	$^{13}C_5$-PFPeA
5:3FTCA	5.14	341	237	217	1.16	$^{13}C_5$-PFHxA
7:3FTCA	6.76	441	317	337	0.69	$^{13}C_5$-PFHxA
EIS Compounds						
$^{13}C_4$-PFBA	1.95	217	172	NA	NA	$^{13}C_3$-PFBA
$^{13}C_5$-PFPeA	4.18	268	223	NA	NA	$^{13}C_2$-PFHxA
$^{13}C_5$-PFHxA	4.80	318	273	120	NA	$^{13}C_2$-PFHxA
$^{13}C_4$-PFHpA	5.32	367	322	NA	NA	$^{13}C_2$-PFHxA
$^{13}C_8$-PFOA	6.16	421	376	NA	NA	$^{13}C_4$-PFOA
$^{13}C_9$-PFNA	6.99	472	427	NA	NA	$^{13}C_5$-PFNA

Table 10. Analyte Ions Monitored, Extracted Internal Standard, and Non-extracted Internal Standard Used for Quantification

Abbreviation	Example Retention Time [1]	Parent Ion Mass	Quantification Ion Mass	Confirmation Ion Mass[2]	Typical Ion Ratio	Quantification Reference Compound
$^{13}C_6$-PFDA	7.47	519	474	NA	NA	$^{13}C_2$-PFDA
$^{13}C_7$-PFUnA	7.81	570	525	NA	NA	$^{13}C_2$-PFDA
$^{13}C_2$-PFDoA	8.13	615	570	NA	NA	$^{13}C_2$-PFDA
$^{13}C_2$-PFTeDA	8.96	715	670	NA	NA	$^{13}C_2$-PFDA
$^{13}C_3$-PFBS	4.78	302	80	99	NA	$^{18}O_2$-PFHxS
$^{13}C_3$-PFHxS	6.30	402	80	99	NA	$^{18}O_2$-PFHxS
$^{13}C_8$-PFOS	7.59	507	80	99	NA	$^{13}C_4$-PFOS
$^{13}C_2$-4:2FTS	4.67	329	81	309	NA	$^{18}O_2$-PFHxS
$^{13}C_2$-6:2FTS	5.82	429	81	409	NA	$^{18}O_2$-PFHxS
$^{13}C_2$-8:2FTS	7.28	529	81	509	NA	$^{18}O_2$-PFHxS
$^{13}C_8$-PFOSA	8.41	506	78	NA	NA	$^{13}C_4$-PFOS
D_3-NMeFOSA	9.70	515	219	NA	NA	$^{13}C_4$-PFOS
D_5-NEtFOSA	9.94	531	219	NA	NA	$^{13}C_4$-PFOS
D_3-NMeFOSAA	7.51	573	419	NA	NA	$^{13}C_4$-PFOS
D_5-NEtFOSAA	7.65	589	419	NA	NA	$^{13}C_4$-PFOS
D_7-NMeFOSE	9.56	623	59	NA	NA	$^{13}C_4$-PFOS
D_9-NEtFOSE	9.83	639	59	NA	NA	$^{13}C_4$-PFOS
$^{13}C_3$-HFPO-DA	4.97	287	169	185	NA	$^{13}C_2$-PFHxA
NIS Compounds						
$^{13}C_3$-PFBA	1.95	216	172	NA	NA	NA
$^{13}C_2$-PFHxA	4.80	315	270	119	NA	
$^{13}C_4$-PFOA	6.16	417	172	NA	NA	
$^{13}C_5$-PFNA	6.99	468	423	NA	NA	
$^{13}C_2$-PFDA	7.47	515	470	NA	NA	
$^{18}O_2$-PFHxS	6.30	403	84	NA	NA	
$^{13}C_4$-PFOS	7.59	503	80	99	NA	

[1] Times shown are in decimal minute units. Example retention times are based on the instrument operating conditions and column specified in Section 10.2.

[2] Many of the EIS and NIS compounds do not produce useful confirmation ions under the instrumental operating parameters. Therefore, monitoring the confirmation ions for the EIS and NIS compounds is optional.

[3] For improved accuracy, PFTrDA is quantitated using the average areas of the labeled compounds $^{13}C_2$-PFTeDA and $^{13}C_2$-PFDoA. However, data systems from some LC/MS/MS vendors may not be able to utilize this approach at this time. In such cases, the laboratory should select the EIS with the stronger response to quantitate PFTrDA and use that EIS for all analyses.

NA = These analytes do not produce a confirmation ion mass or do not have a quantitation reference compound.

Table 11. Summary of Quality Control

Method Reference	Requirement	Specification and Frequency
Section 10.1	Mass Calibration	Annually and on as-needed basis
Section 10.1.7	Mass Calibration Verification	After mass calibration
Section 10.3	Initial Calibration (ICAL)	Minimum 6 calibration standards for linear model and 7 calibration standards for non-linear models.
Sections 10.2.2, 14.4	Retention Time (RT) window	After ICAL and at the beginning of analytical sequence
Sections 7.3.1, 9.4	Extracted Internal Standard (EIS) Analytes	All CAL standards, batch QC and field samples
Sections 7.3.2	Non-extracted Internal Standards (NIS)	All CAL standards, batch QC and field samples
Sections 7.3.4, 10.3.1, 13.3	Instrument Sensitivity Check (ISC)	At the beginning of each analytical sequence
Section 7.3.5, 14.8	Qualitative Identification Standards	At the beginning of each analytical sequence
Section 7.5, 10.3.5, 14.2	Bile Salt Interference Check	After an initial calibration and during each analytical sequence
Sections 9.1.3, 9.5, 14.7	Method Blank	One per preparation batch
Section 9.7	Laboratory Duplicate	One per preparation batch (if required)
Section 9.8	Field Duplicate	Per project specifications (if required)
Sections 9.9 and 11.0	Matrix Spike (MS/MSD)	One per preparation batch (if required)
Section 11.0	Limit of Quantitation Verification (LLOPR)	One per preparation batch
Section 14.3	Calibration Verification (CV)	At the beginning of the analytical sequence (except for sample analyzed immediately after an initial calibration) and every 10 field sample injections
Section 14.3.5, 15.1.3	Ion abundance ratio (IAR) check	Each analyte to be reported as detected from a field or QC sample
Section 14.5	Ongoing Precision Recovery (OPR)	One per preparation batch
Section 14.6	Instrument Blank	At the beginning of each analytical sequence, and after high standards and high concentration samples

21.0 Glossary

These definitions and purposes are specific to this method but have been conformed to common usage to the extent possible.

21.1 Units of weight and measure and their abbreviations

21.1.1 Symbols

ºC	degrees Celsius
Da	Dalton (equivalent to "amu" below)
µg	microgram
µL	microliter
µm	micrometer
<	less than
≤	less than or equal
>	greater than
≥	greater than or equal
%	percent
±	plus or minus

21.1.2 Alphabetical abbreviations

amu	atomic mass unit (equivalent to Dalton)
cm	centimeter
g	gram
h	hour
L	liter
M	molar
mg	milligram
min	minute
mL	milliliter
mm	millimeter
cm	centimeter
m/z	mass-to-charge ratio
ng	nanogram
Q1	quantitation ion
Q2	confirmation ion
rpm	revolutions per minute
v/v	volume per volume (percent)

21.2 Definitions and acronyms (in alphabetical order)

Analyte – A PFAS compound included in this method. The analytes are listed in Table 1.

Calibration standard (CS) – A solution prepared from a secondary standard and/or stock solutions and used to calibrate the response of the LC-MS/MS instrument.

Calibration verification standard (CV) – The mid-point calibration standard (CS-4) that is used to verify calibration. See Table 4.

CFR – Code of Federal Regulations

Compound – One of many variants or configurations of a common chemical structure. Individual compounds are identified by the number of carbon atoms and functional group attached at the end of the chain.

Confirmation ion – For the purpose of this method, the confirmation ion is produced by collisionally activated dissociation of a precursor ion to produce distinctive ions of smaller *m/z* than the precursor. It is used to confirm the identity of the analyte.

Class A glassware – Volumetric glassware that provides the highest accuracy. Class A volumetric glassware complies with the Class A tolerances defined in ASTM E694, must be permanently labeled as Class A, and is supplied with a serialized certificate of precision.

CWA – Clean Water Act

Extracted internal standard (EIS) – An isotopically labeled analog of a target analyte that is structurally identical to a native (unlabeled) analyte. The EIS compounds are added to the sample at the beginning of the sample preparation process and are used to quantify the native target analytes.

Extracted internal standard (EIS) quantification – The process of determining the concentration of the native target analyte by its comparing response to the response of a structurally related isotopically labeled analog that was added to the sample at the beginning of the sample preparation process.

LC – Liquid chromatograph or liquid chromatography

Instrument sensitivity check – solution used to check the sensitivity of the instrument. The solution contains the native compounds at the concentration of the LOQ.

Internal standard – A labeled compound used as a reference for quantitation of other labeled compounds and for quantitation of native PFAS compounds other than the compound of which it is a labeled analog. See Internal standard quantitation.

Internal standard quantitation – A means of determining the concentration of (1) a native compound by reference to a compound other than its labeled analog and (2) a labeled compound by reference to another labeled compound.

IPR – Initial precision and recovery; four aliquots of a reference matrix spiked with the analytes of interest and labeled compounds and analyzed to establish the ability of the laboratory to generate acceptable precision and recovery. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified.

Isotope dilution (ID) quantitation – A means of determining a native compound by reference to the same compound in which one or more atoms has been isotopically enriched. The labeled PFAS are spiked into each sample and allow identification and correction of the concentration of the native compounds in the analytical process.

Isotopically labeled compound – An analog of a target analyte in the method which has been synthesized with one or more atoms in the structure replaced by a stable (non-radioactive) isotope of that atom. Common stable isotopes used are ^{13}C (Carbon-13) or Deuterium (D or ^{2}H). These labeled compounds do not occur in nature, so they can be used for isotope dilution quantification

or other method-specific purposes. These compounds are used as both extracted internal standards and non-extracted internal standards in this method.

Limit of quantitation (LOQ) – The smallest concentration that produces a quantitative result with known and recorded precision and bias. The LOQ shall be set at or above the concentration of the lowest initial calibration standard (the lowest calibration standard must fall within the linear range).

Low-level OPR (LLOPR) – A version of the ongoing precision and recovery standard that is spiked at twice the concentration of the laboratory's LOQ and used as a routine check of instrument sensitivity.

Method blank – An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, internal standards, and labeled compounds that are used with samples. The method blank is used to determine if analytes or interferences are present in the laboratory environment, the reagents, or the apparatus.

Method detection limit (MDL) – The minimum measured concentration of a substance that can be reported with 99% confidence that the measured analyte concentration is distinguishable from method blank results (40 CFR 136, Appendix B).

MESA – Mining Enforcement and Safety Administration

Minimum level of quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence. It may be equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. Alternatively, the ML may be established by multiplying the MDL (pooled or unpooled, as appropriate) by 3.18 and rounding the result to the number nearest to 1, 2, or 5 x 10^n, where n is zero or an integer (see 68 FR 11770).

MS – Mass spectrometer or mass spectrometry

Matrix spike/matrix spike duplicate (MS/MSD) – Aliquots of field samples that have been fortified with a known concentration of target compounds, prior to sample preparation and extraction, and analyzed to measure the effect of matrix interferences. The use of MS/MSD samples is generally not required in isotope dilution methods because the labeled compounds added to every sample provide more performance data than spiking a single sample in each preparation batch.

Multiple reaction monitoring (MRM) – Also known as selected reaction monitoring (SRM). A type of mass spectrometry where a parent mass of the compound is fragmented through MS/MS and then specifically monitored for a single fragment ion.

Must – This action, activity, or procedural step is required.

NIOSH – The National Institute of Occupational Safety and Health

Non-extracted internal standard (NIS) –Labeled PFAS compounds spiked into the concentrated extract immediately prior to injection of an aliquot of the extract into the LC-MS/MS.

OPR – Ongoing precision and recovery standard (OPR); a method blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to assure that the results produced by the laboratory remain within the limits specified in this method for precision and recovery.

PFAS – Per- and Polyfluoroalkyl substances –A group of man-made fluorinated compounds, many of which are hydrophobic and lipophobic, manufactured and used in a variety of industries globally. These compounds are persistent in the environment as well as in the human body. This method analyzes for the PFAS listed in Table 1.

Precursor ion – For the purpose of this method, the precursor ion is the deprotonated molecule ([M-H]-) of the method analyte. In MS/MS, the precursor ion is mass selected and fragmented by collisionally activated dissociation to produce distinctive product ions of smaller *m/z*. Also called a parent ion.

Product ion – For the purpose of this method, a product ion is a charged fragment ion that is formed as the product of collisionally activated dissociation of a particular precursor ion. Also called a transition or transition ion.

Quantification ion – For the purpose of this method, the quantification ion is produced by collisionally activated dissociation of a precursor ion to produce distinctive ions of smaller m/z than the precursor. It is used to quantify (determine the concentration) of the analyte. It is usually, but not always, the most intense of the ions produced by the dissociation of the precursor ion.

Reagent water – Water demonstrated to be free from the analytes of interest and potentially interfering substances at the method detection limit for the analyte.

Relative centrifugal force (RCF) – Refers to the force applied to a material that is centrifuged. It is a function of the speed of rotation of the centrifuge (i.e., revolutions per minute or rpm) and the radius of the centrifuge head. It can be calculated from an rpm setting using the formula:

$$RCF = rpm^2 \times 1.118\,x\,10^{-5} \times radius$$

Relative standard deviation (RSD) – The standard deviation multiplied by 100 and divided by the mean. Also termed "coefficient of variation."

Relative standard error (RSE) – The standard error of the mean divided by the mean and multiplied by 100.

RF – Response factor. See Section 10.3.3.2.

RR – Relative response. See Section 10.3.3.2.

RT – Retention time**;** the time it takes for an analyte or labeled compound to elute off the HPLC/UPLC column

Should – This action, activity, or procedural step is suggested but not required.

Signal-to-noise ratio (S/N) – The height of the signal as measured from the mean (average) of the noise to the peak maximum divided by the mean height of the noise.

SPE – Solid-phase extraction; a technique in which an analyte is extracted from an aqueous solution, or a solid/tissue extract by passage over or through a material capable of reversibly adsorbing the analyte. Also termed liquid-solid extraction.

Stock solution – A solution containing an analyte that is prepared using a reference material traceable to the EPA, NIST, or a source that will attest to the purity and authenticity of the reference material.

Appendix A - Sample Pre-screening Instructions

Samples that are known or suspected to contain high levels of analytes may be pre-screened using the following procedure. These are example procedures using smaller sample aliquots spiked with EIS and NIS and no clean up procedures. Other pre-screening procedures may be used. The results of the pre-screening should be used by the analyst to assess the need for sample or extract dilutions necessary to keep the target analytes within the calibration range of the instrument. The results may also be used to reduce the risk of prevent gross contamination of the instrument when dealing with unfamiliar sources of samples.

Aqueous Samples

1. Weight out 10 (±0.1) g of sample into a 50-mL centrifuge tube.
2. Add 50 µL of EIS and NIS to the sample and vortex to mix.
3. Filter 1 mL of the sample through 0.2-µm membrane filter into a microvial. Sample is ready for instrumental analysis.

Solid and Tissue Samples

1. Weigh 1.0 (±0.1) g sample into 50-mL polypropylene centrifuge tubes.
2. Add 20 mL of 0.3% methanolic ammonium hydroxide (Section 7.1.7.1). Vortex and mix on a shaker table (or equivalent) for 10 min. Allow to settle and/or centrifuge to produce a clear extract.
3. Filter using a SINGLE StEP® filter vial:
   a. Add 20 µL of EIS to a clean SINGLE StEP® filter vial (chamber).
   b. Add 400 µL of clear extract from step 2 (e.g., by adding extract until it reaches the fill line), carefully vortex to mix.
   c. Use filter/plunger part and filter.
4. Transfer 30 µL of filtrate to a ~300-µL polypropylene micro-vial and dilute to 300 µL with 0.3% methanolic ammonium hydroxide (Section 7.1.7.1). Add NIS to the filtrate.
5. The extract is now a 10x dilution.
6. Sample is ready for instrumental analysis.

Calculate results using the equivalent sample weight computed as follows:

$$Equivalent\ Weight = Sample\ weight\ (g) \times \frac{0.4\ mL}{20\ mL}$$

Note that the EIS concentration in the diluted portion is 0.5x the level in the regular analysis of solid samples.

Appendix B - Aqueous Sample Subsampling Instructions

Warning: Because some target analytes may be stratified within the sample (e.g., AFFF-contaminated media, surfactants), or adhere to the walls of the sample container, subsampling may only be done on a project-specific basis. Subsampling has been shown to increase uncertainty in PFAS analysis, especially on foaming samples. As noted in Section 11.0, the laboratory must notify the client before proceeding with the preparation of a subsample, in the event that a more appropriate size sample can be collected and sent to the laboratory. Once the laboratory becomes familiar with the levels of PFAS in the samples for their clients, the samples should be collected in the appropriate sample container size to avoid subsampling. The sample data report must state when subsampling has been employed.

If a reduced sample size is required, transfer a weighed subsample using the following subsampling procedure to a 60-mL HDPE bottle and dilute to approximately 60 mL using reagent water. This container is now considered the "sample bottle."

1. Gently invert sample 3-4 times being careful to avoid foam formation and subsample immediately (do not let stand).

2. If foam forms and more than 5 mL is required – pour sample, avoiding any foam.

3. If foaming forms and a volume less than 5 mL is required – pipette from ½ cm below the foam.

4. If no foam forms – pour or pipette based on volume required.

APPENDIX F

NYSDOH Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX G

Standard Forms

AECOM	*Client:* Ashland LLC	***BORING ID:***
	Project Number: 60669081	
	Boring Location:	
		Sheet: 1 of 1
	Drilling Method:	*Date/Time Started:*
	Weather:	
Logged By:		*Date/Time Finished:*
Drilled By:		

Depth (ft)	Sample Number	Sample Type	Recovery (ft)	PID reading*	MVA reading	U.S.C.S	**Lithologic Description**	Lab Sample ID
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

END OF BORING @

NOTES:

* units relative to isobutylene span gas in parts per million (ppm)
f - fine; m - medium; c - coarse
NA - not applicable
SAA - Same as above

Checked by:_____ Date:_____

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

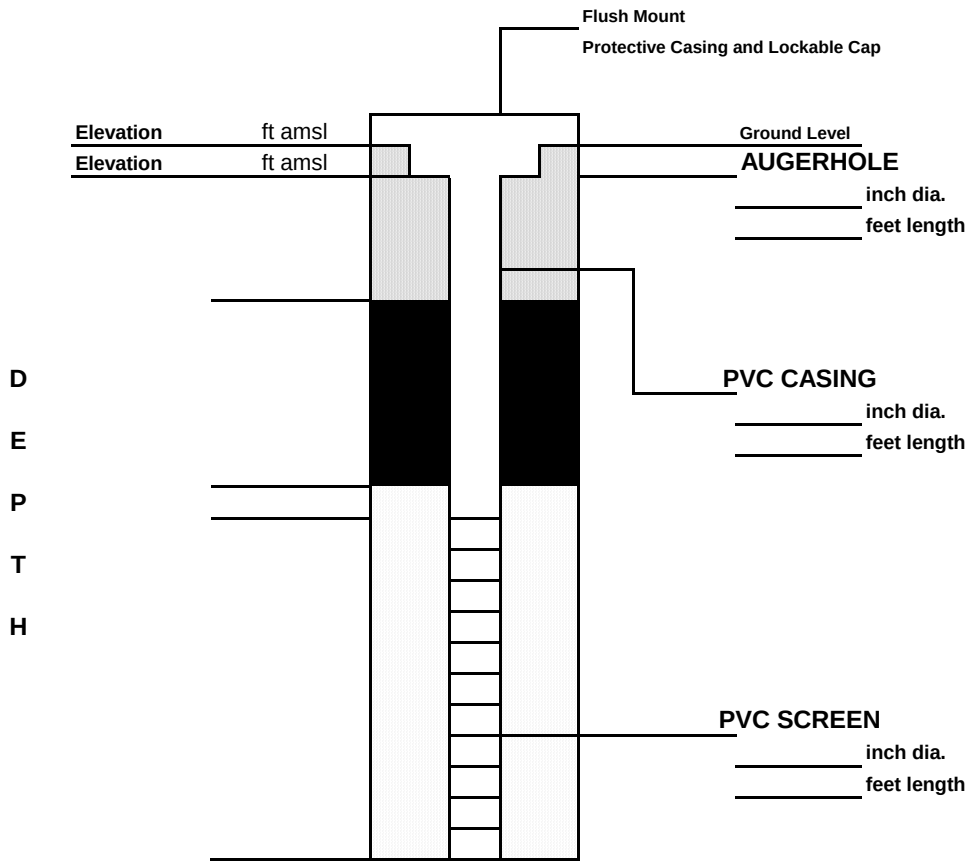
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description
	See boring log for lithologic description.

WELL DESIGN



CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface:	**Type:**	**Type:** 00N Sand **Setting:** _ to _ ft
Monitor:	**Slot Size:**	***SEAL MATERIAL*** **Type:** Bentonite **Setting:** _ to _ ft

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: Ashland LLC	**Location: 4625 River Road, Tonawanda, NY**	**Project No.: 60669081**
AECOM	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:**

SITE NAME: _____ SITE ID.: _____

INSPECTOR: _____

MONITORING WELL FIELD INSPECTION LOG

DATE/TIME: _____

WELL ID.: _____

	YES	NO
WELL VISIBLE? (If not, provide directions below)		

WELL COORDINATES? NYTM X _____ NYTM Y _____ See Report

	YES	NO
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back)		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: .....

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED ..... _____

TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) ..... _____

PROTECTIVE CASING MATERIAL TYPE: ..... _____

MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): .....

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ..... _____

MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ..... _____

MEASURE WELL DIAMETER (Inches): ..... _____

WELL CASING MATERIAL: ..... _____

PHYSICAL CONDITION OF VISIBLE WELL CASING: ..... _____

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ..... _____

PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES ..... _____

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.).

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

DRUM LOG

AECOM

SITE NAME: _____ PROJECT NUMBER: _____

SITE ADDRESS: _____

_____ CLIENT: _____

_____ _____

DRUM ID NUMBER	DATE STARTED/ CLOSED	BORING / WELL LOCATION	MATRIX	CONTENTS / COMMENTS	SOLID WASTE (Y/N)	RCRA WASTE (Y/N)

_____ _____

AECOM ONSITE REPRESENTATIVE (PRINT) (SIGN)

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: _____ Site: Tank 75 Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: AECOM

Purging/ Sampling Device: GeoPump Peristaltic Tubing Type: LDPE Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water (ft.): _____ Depth to Well Bottom (ft.): _____ Well Diameter: _____ Screen Length: _____

Casing Type: PVC Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (°C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	0.1	---	3%	10%	10%	+ or - 10	---	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft.; 1 inch diameter well = 154 ml/ft.; 2 inch diameter well = 617 ml/ft.; 4 inch diameter well = 2470 ml/ft. ($vol_{cyl} = \pi r^2 h$)

Remarks:

AECOM

SEDIMENT SAMPLING LOG

PROJECT:			**BORING ID:**
CLIENT:	**JOB NUMBER:**		
DATE STARTED:		**AECOM GEOLOGIST:**	
DATE COMPLETED:			
CONTRACTOR:			
EQUIPMENT:			
LOCATION:			
PURPOSE:			
DEPTH OF WATER:			

DEPTH (inches)	VERTICAL PROFILE DESCRIPTION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Water depth approximately:

Sample ID:

Additonal Notes:

SLUG TEST FIELD FORM

AECOM

Geologist: _____

Project Name: _____

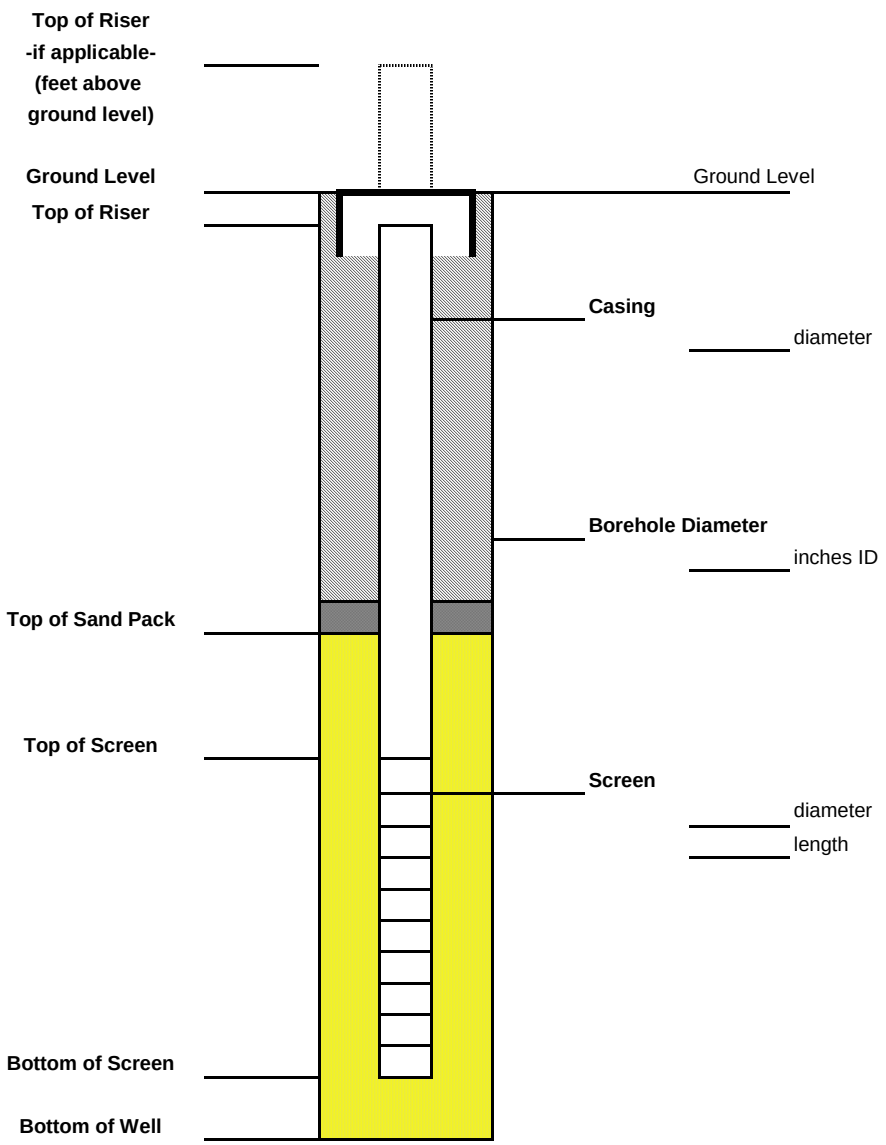
Project #: _____

Location: _____

Date & Time: _____

Weather:	
Well ID:	
DT Product:	
DT Water:	
Depth to Bottom:	
Troll ID #:	
Slug ID #:	
Slug Length:	
Slug Diameter:	

Volume of Slug: _____ in^3



SLUG IN (FALLING HEAD TEST)

Test Name: _____

Length of test: _____ min

Depth to static water level: _____

Initial Displacement: _____

SLUG OUT (RISING HEAD TEST)

Test Name: _____

Length of test: _____ min

Depth to static water level: _____

Initial Displacement: _____

Time	DTP	DTW	Comment	Time	DTP	DTW	Comment

Comments: _____

WELL DEVELOPMENT LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____ PAGE: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=		3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=		4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=		5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 5)	=		6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)											
PARAMETERS	Init											
pH												
SPEC. COND. (mS)												
TURBIDITY												
TEMPERATURE (°C)												
APPEARANCE												
TIME												

COMMENTS:

APPENDIX H

DER-10 Fish and Wildlife Resources Impact Analysis Decision Key

Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key	If YES Go to:	If NO Go to:
1. Is the site or area of concern a discharge or spill event?	13	2
2. Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13	3
3. Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4	9
4. Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5
5. Has the contamination gone off-site?	6	14
6. Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7	14
7. Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8
8. Does contamination exist at concentrations that could exceed ecological impact SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14
9. Does the site or any adjacent or downgradient property contain any of the following resources? i. Any endangered, threatened or special concern species or rare plants or their habitat ii. Any DEC designated significant habitats or rare NYS Ecological Communities iii. Tidal or freshwater wetlands iv. Stream, creek or river v. Pond, lake, lagoon vi. Drainage ditch or channel vii. Other surface water feature viii. Other marine or freshwater habitat ix. Forest x. Grassland or grassy field xi. Parkland or woodland xii. Shrubby area xiii. Urban wildlife habitat xiv. Other terrestrial habitat	11	10
10. Is the lack of resources due to the contamination?	3.10.1	14
11. Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14	12
12. Does the site have widespread surface soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	12
13. Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact DEC for information regarding endangered species.)	Section 3.10.1	14
14. No Fish and Wildlife Resources Impact Analysis needed.		

Appendix 4
FWRIA Part 3
Ecological Effects of Remedial Alternatives

(a) When developing and evaluating remedial alternatives, the following considerations should be incorporated into remedy selection, as appropriate.

1. Has the information collected in the FWRIA Part 1 and 2 been incorporated into the development of alternatives?

2. Have actual or potential adverse impacts to fish and wildlife resources been identified?

3. Have contaminants of ecological concern been identified?

4. Have remedial action objectives been established for the contaminants of ecological concern and the protection of the impacted resources?

5. Have ecologically based cleanup levels been identified and the alternatives evaluated in terms of the ability to meet ecologically based cleanup levels?

6. Have the alternatives been evaluated in terms of the expected reduction in the toxicity or bioaccumulation of contaminants?

7. If human health based or other SCGs are proposed as cleanup levels, will the adverse impacts to fish and wildlife resources be eliminated or adequately mitigated?

8. Have alternatives been evaluated in terms of contaminant-related impacts that would remain after implementation?

9. Does the recommended alternative eliminate or adequately mitigate the adverse impacts to fish and wildlife resources? If not, why not?

10. Have applicable resource related SCGs been identified?

11. Have the alternatives been evaluated in terms of the non-contaminant related effects such as temporary and/or permanent loss of, or damage to the resource during implementation?

12. Has the remedial alternative that best maintains or restores fish and wildlife resources been identified? Has an alternative been included that maximizes the acreage of habitat remediated?

13. Has the need for a post-remedial monitoring program (including biological monitoring) been identified? Is a conceptual monitoring program included which can evaluate the long term effectiveness of the remediation?

(b) The above will be incorporated into the remedy selection report for the site prepared in accordance with section 4.4.

APPENDIX I

Green Remediation Best Management Practices

United States Environmental Protection Agency
Office of Solid Waste and Emergency Response (5102G)
EPA 542-F-09-004
December 2009

Green Remediation Best Management Practices: Site Investigation

Office of Superfund Remediation and Technology Innovation
Quick Reference Fact Sheet

The U.S. Environmental Protection Agency (EPA) *Principles for Greener Cleanups* outline the Agency's policy for evaluating and minimizing the environmental "footprint" of activities undertaken when cleaning up a contaminated site.[1] Use of the best management practices (BMPs) recommended in EPA's series of green remediation fact sheets can help project managers and other stakeholders apply the principles on a routine basis, while maintaining the cleanup objectives, ensuring protectiveness of a remedy, and improving its environmental outcome.[2]

Overview

The need for site investigation is common to cleanups under any regulatory program. An investigation can occur at all points in the cleanup process, from initial site assessment through waste site closeout. A site investigation generally is undertaken to:

- Confirm the presence or absence of specific contaminants
- Delineate the nature and extent of environmental contamination
- Identify contaminant sources
- Provide the data necessary to assess potential risk to human health and/or the environment
- Gather the data needed to determine if a remedial action should be taken
- Understand site characteristics impacting the remedy design, construction, or operation and closeout, and
- Evaluate performance of a remedial action.

Site investigations typically involve sampling of soil and groundwater using various drilling and well installation technologies and analysis of samples at offsite laboratories. Investigations also may include sampling of sediment, surface water, soil gas, or indoor air; searching for underground storage tanks (USTs) or other buried objects; or evaluating demolition material containing asbestos, lead-based paint, or other toxic products.

Planning for Site Investigation

Consideration of green remediation options early during the project design phase will help reduce cumulative environmental footprints of a cleanup. Effective planning will include identification of investigative decision points in context of a site's unique contamination scenario and logistics, while accounting for potential remedies and anticipated site reuse.

At each decision point, strategies and methods can be evaluated to determine which are likely to best address the core elements of a green cleanup:



- Reducing total energy use and increasing renewable energy use
- Reducing air pollutants and greenhouse gas (GHG) emissions
- Reducing water use and negative impacts on water resources
- Improving materials management and waste reduction efforts, and
- Enhancing land management and ecosystems protection.

A green site investigation relies on information gained from a thorough preliminary assessment that identifies target areas and site conditions through minimally intrusive techniques. Use of innovative field analytics and direct sensing tools can reduce the environmental footprint of follow-on characterization or cleanup activities, particularly by limiting mobilizations in the field and increasing the density of analytical data. More targeted remedial actions and "surgical" removal actions also can be achieved through use of high resolution sampling tools during site investigations.

Initial BMPs for a site investigation include:

- Evaluating feasibility of using a mobile laboratory, field analytical methods, or direct sensing tools
- Scheduling activities for appropriate seasons to reduce delays caused by weather conditions and fuel needed for heating or cooling
- Identifying local sources of energy efficient machinery and vehicles and alternative fuels
- Establishing electronic networks for data transfers and deliverables, team decisions, and document preparation, and selecting electronic products on the basis of comparisons available in the Electronic Product Environmental Assessment Tool (EPEAT®)
- Selecting facilities with green policies, for worker accommodations and periodic meetings
- Reducing travel through increased teleconferencing, compressed work hours, and flexible work locations, and
- Identifying options for integrating renewable energy resources, including those extending throughout cleanup activities.

147209



Portable electricity generators equipped with photovoltaic panels and batteries can be used to power investigative equipment such as chilling or heating units.

Procurement of goods and services offers other opportunities for conserving natural resources:

- Incorporate green specifications into solicitations and contracts, with respect to environmentally preferred purchasing of materials, awards to contractors with green policies and procedures (such as routine use of water efficient and Energy Star® equipment) and periodic reporting of resource reductions
- Select service providers, product suppliers, and analytical laboratories from the local area and coordinate service and delivery schedules, to reduce fuel consumption and associated air emissions, and
- Specify laboratory analytical methods generating less waste and solvents, such as solid phase micro extraction (SPME), pressurized fluid extraction, microwave extraction, and supercritical fluid extraction, if comparable accuracies can be achieved; for example, SPME provides a single-step process that can reduce sample preparation time by as much as 70% while using little or no solvents.

Collection of representative data during the first round of field activities reduces the need for subsequent sampling. Development of a well conceived site sampling plan can help assure that collected data truly represent a site. Systematic planning, a critical component of optimized strategies for investigating hazardous waste sites, involves identifying key decisions to be made, developing a conceptual site model (CSM) to support decision making, and evaluating decision uncertainty along with approaches for actively managing that uncertainty. The CSM combines analytical data with historical information to identify data gaps and allows for refinement as additional data become available.

Collecting information dynamically and in real time and adjusting the work according to the field findings will minimize mobilizations. Dynamic work strategies that employ data visualization, dynamic sampling programs, and quality controls to minimize uncertainties reduce the need for repeated mobilizations and additional sampling. Use of the Triad approach can help project managers integrate systematic planning, dynamic working strategies, and deployment of these real-time measurement tools.[3]

Energy Use & Renewable Energy

Fewer field mobilizations can result in significant savings of fossil fuel and minimized emission of GHG and other air pollutants. Real-time field measurements can immediately provide data to help determine the next course of action during a single sampling event. Real-time data collection technologies include:

- Direct sensing technology such as the membrane interface probe, laser-induced fluorescence (LIF) sensor, and cone penetrometer testing (CPT)
- X-ray fluorescence analyzers for metals
- Soil gas surveys for volatile organic compounds (VOCs)
- Portable gas chromatography/mass spectrometry for fuel-related compounds and VOCs in soil and groundwater
- Field test kits for analyzing soil and groundwater contaminants such as petroleum, metals, polychlorinated biphenyls, pesticides, explosives, and inorganics, and
- Geophysical surveys for locating USTs, buried steel drums, and boundaries of disposal areas.

Profile: McGuire Air Force Base, C-17 Hangar Site, New Hanover, NJ

- *Used a Triad decision making approach to complete characterization of VOC contamination of soil and groundwater ahead of schedule, consequently reducing the fuel consumption, land disturbance, and dust generation associated with additional sampling days*
- *Used investigative tools such as CPT and fuel fluorescence detectors to generate over 4,500 analytical results in real time, which expedited decision making in the field and avoided fuel use associated with transporting samples to an offsite laboratory*
- *Determined through real-time measurements that natural attenuation of halogenated VOCs was occurring, and avoided excess land disturbance and fuel consumption by incorporating monitored natural attenuation into the remedy*
- *Precisely identified a smear zone of Stoddard solvent, allowing it to be surgically excavated with minimal land disturbance and fuel consumption*

Recommended BMPs for selecting other equipment and processes that minimize fuel and energy consumption include:

- Limiting the number of vehicles deployed onsite, and renting electric, hybrid, or hydrogen fuel cell vehicles
- Instituting idle reduction plans, such as machinery shutdown after three minutes of non-use
- Compressing shipments to offsite laboratories whenever feasible
- Using in situ data loggers wherever appropriate to monitor water levels and water quality parameters

- Using solar-powered telemetry systems to remotely transmit logging data directly to project offices
- Using rechargeable batteries for handheld data loggers and other field instruments
- Using direct-push technology (DPT) for well drilling, which is 50-60% more time efficient than rotary drill rigs and avoids drill cuttings that require assessment and disposal of investigation-derived waste (IDW)
- Segregating soil and groundwater collected from different areas; in many states, media analytically determined to be clean can be deposited onsite rather than transported for offsite disposal, and
- Disposing IDW at the nearest permitted facility.

Air Pollutants & GHG Emissions

Air emissions from mobile sources can be reduced through use of various new technologies. Diesel emission control filters, for example, can reduce particulate matter emissions by as much as 89% and nitrogen oxide emissions by as much as 80%. Switching from low-sulfur to ultralow-sulfur fuels will reduce emissions of sulfur dioxide (an acid rain-causing air pollutant) and also allows use of emission control systems that would be damaged by fuels with a higher sulfur content. Ultralow-sulfur diesel has become the standard in most states; it contains no more than 15 ppm sulfur (S), in comparison to the 500 ppm S in low-sulfur diesel.

Any technology that reduces duration of drilling and groundwater pumping or purging helps reduce the cumulative amounts of pollutants released to the air. Examples include sonic drilling and passive (diffusion-based) sampling devices.

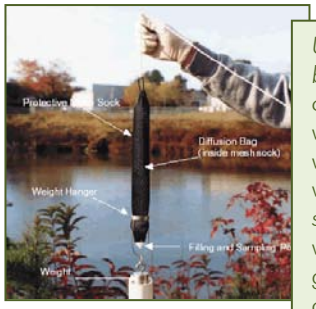
Deployment of diesel-powered machinery, vehicles, and equipment over six months of investigations could emit nearly 32,000 pounds of CO_2, based on a consumption of more than 1,400 gallons of diesel.[4]

Relative Diesel Consumption of Common Investigative Activities over Six Months (gallons)	
Transportation, operation, and support for a rotary drilling rig for four weeks	293
Groundwater sampling with a submersible pump driven by a 2.5-hp gasoline-powered generator	45
Deployment of a truck-mounted DPT rig for subsurface sampling	400
Operation of utility trucks for equipment maintenance, groundwater and soil sampling, and oversight	300
Periodic truck delivery of small equipment and supplies and disposal of nonhazardous waste	260
IDW transfer to a disposal facility by way of tractor trailer	125
Total diesel consumed: 1,423 gallons	

Water Use & Impacts on Water Resources

Green remediation strategies help reduce consumption of fresh water, reclaim or reuse uncontaminated water, minimize potential for waterborne contamination, and minimize introduction of toxic processing materials during a site investigation. Recommended best practices include:

- Using waterless drilling techniques such as DPT
- Exploring options for reusing operational graywater and capturing rainwater for tasks such as irrigation or dust control
- Returning unused clean water to surface water bodies rather than discharging it to a public sewer system
- Using low-flow sampling equipment wherever possible during monitoring, to minimize purge volumes and energy consumption while producing little IDW



Use of passive diffusion bag samplers reduces or eliminates purge water associated with well sampling; multiple vertically-placed samplers can provide a vertical profile of groundwater samples at one-foot intervals.

- Steam-cleaning or using phosphate-free detergents instead of organic solvents or acids to decontaminate sampling equipment
- Containing decontamination fluids and preventing their entrance into storm drains or the ground surface
- Treating potentially contaminated purge water through use of appropriate treatment techniques such as activated carbon filtration prior to discharge to storm drains or waterways
- Using closed-loop cleaning systems relying on graywater to wash non-sampling related machinery and equipment
- Using biodegradable hydraulic fluids on hydraulic equipment such as drill rigs
- Selecting groundwater monitoring equipment made of noncorrosive material, to avoid potential cross-contamination and equipment replacement, and
- Quickly restoring any vegetated areas disrupted by equipment or vehicles, to control stormwater runoff and avoid soil transport to surface water bodies.

Integrating the needs of remedial and monitoring phases during design of sampling wells will help reduce subsurface drilling throughout the life of a cleanup. Well designs also can accommodate a site's potential cleanup remedy(s) and reuse goals, in ways that meet the site's future demand for water while preserving any portions of the property targeted for specific use.

Materials Management & Waste Reduction

Site investigation procedures typically involve use of an assortment of manufactured products such as personal protective equipment (PPE), sample containers, and routine business materials. Green purchasing considers product lifecycles and gives preference to:

- Products with recycled and biobased contents such as agricultural or forestry waste instead of petroleum-based ingredients
- Products, packing material, and disposable equipment with reuse or recycling potential, and
- Products manufactured through processes involving nontoxic chemical alternatives.

IDW generation and management account for a significant portion of the environmental footprints of site investigation. IDW includes drill cuttings, well purge water, spent carbon from filtration equipment, reagents used with environmental field test kits, contaminated PPE, and solutions for decontaminating non-disposable PPE and equipment.

Reducing the volume of generated IDW will decrease the need for related containers such as plastic disposal bags and 55-gallon storage drums, and for treatment or disposal of IDW in an appropriate hazardous or nonhazardous waste facility. Recommended BMPs to reduce the volume of routine waste or IDW and decrease materials consumption include:

- Recycling cardboard boxes and beverage bottles
- Reducing use of single-use plastic bags
- Reducing the number of sampling days
- Using onsite analysis and other real-time measurement technologies to reduce needs for sample packing materials
- Selecting test kits that generate less waste, such as soil samplers with reusable handles for coring syringes, and
- Segregating drill cuttings by appropriately stockpiling next to a borehole and awaiting analytical results; under many cleanup programs, clean soil may be distributed near boreholes or backfilled into a boring.

Explore Web-based calculators, software models, and other ***Footprint Assessment*** tools accessible on Green Remediation Focus (http://www.cluin.org/greenremediation), such as the:

- CICA Compliance Summary Tool, to evaluate construction impacts on land, ecosystems, and water
- Energy & Materials Flow & Cost Tracker (EMFACT™), to track materials, energy use, wastes, and costs
- Greenhouse Gas Protocol, to quantify and manage GHG emissions
- MotorMaster+, to select energy efficient motors, and
- Water Evaluation and Planning System (WEAP), to conduct integrated water resource planning

Land Management & Ecosystem Protection

Site investigation activities can disturb a significant amount of land in order to gather the necessary data. Project managers should consider technologies resulting in limited subsurface intrusion and minimal land impacts:

- Ground penetrating radar or other geophysical methods can identify subsurface anomalies such as USTs and buried drums without disturbing land.
- DPT for soil and groundwater sampling do not result in drill cuttings or excess soil waste and related IDW.
- A wide range of direct sensing tools such as the LIF sensor are now available to develop a nearly continuous vertical profile of some volatile and semi-volatile contaminants in the subsurface, both above and below the water table.
- Soil gas surveys are minimally invasive and can provide relatively rapid and cost-effective information about the presence, composition, and distribution of contaminants in the vadose zone and water table.

A Sampling of Success Measures for Site Investigation

- *Reduced fuel consumption and GHG emissions through integrated planning of field activities*
- *Increased use of solar energy-driven auxiliary equipment and small devices*
- *Reduced generation of wastewater from well drilling and sampling*
- *Reduced subsurface and ecosystem disturbance through more use of advanced sampling technologies and visualizing techniques*
- *Fewer soil and groundwater samples needing offsite laboratory analysis*

References [Web accessed: 2009, November 30]

[1] U.S. EPA; *Principles for Greener Cleanups;* August 27, 2009; http://www.epa.gov/oswer/greencleanups

[2] U.S. EPA; *Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites;* EPA 542-R-08-002, April 2008; http://www.cluin.org/greenremediation

[3] Interstate Technology & Regulatory Council; *Technical and Regulatory Guidance for the Triad Approach: A New Paradigm for Environmental Project Management;* December 2003; http://www.triadcentral.org/

[4] U.S. EPA; *Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel;* EPA420-F-05-001

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Office of Solid Waste and Emergency Response (5203P)

EPA 542-F-13-003
December 2013

Green Remediation Best Management Practices:
Materials and Waste Management

Office of Superfund Remediation and Technology Innovation — Quick Reference Fact Sheet

The U.S. Environmental Protection Agency (EPA) *Principles for Greener Cleanups* outline the Agency's policy for evaluating and minimizing the environmental "footprint" of activities undertaken when cleaning up a contaminated site.[1] Use of the best management practices (BMPs) identified in EPA's series of green remediation fact sheets can help project managers and other stakeholders apply the principles on a routine basis, while maintaining the cleanup objectives, ensuring protectiveness of a remedy, and improving its environmental outcome.

The use of non-renewable materials such as minerals, metals, and fossil fuel-derived products has significantly increased in the United States over recent decades. In 1900, for example, 41% of the materials used in the United States consisted of renewable resources such as agricultural, fishery, and forestry products. By 1995, renewable resources accounted for only 6%.[2] Much of this increase is due to the rapid growth of manufacturing processes that consume nonfuel minerals. Currently, more than 25,000 pounds per capita of new nonfuel minerals are extracted from the earth each year as input for manufactured products used in the United States.

Increased reliance on non-renewable resources and accelerated consumption of raw, processed, and manufactured materials has led to adverse environmental effects. The effects include habitat destruction, biodiversity loss, over-stressed fisheries, desertification, and greenhouse gas (GHG) emission. In 2006, materials management accounted for 42% of GHG emissions in the United States.[3]

Materials management refers to the control of material resources throughout their life cycle as they flow through the economy, from extraction or harvest through production and transport of goods, provision of services, reuse of materials, and, if necessary, disposal.

The process of cleaning up a contaminated site often involves purchasing and consuming large volumes of manufactured items as well as raw or processed resources. Site cleanup can also generate significant volumes of waste such as:

- Industrial materials and products accumulated as debris during onsite demolition of structures and during remedy construction
- Organic materials such as wood and plant matter displaced during excavation
- Metal, glass, plastic, or paper containers and packaging from single-use products, including field supplies such as test kits for soil or water sampling, and
- Expended products such as fabric tarps and metal tooling or chemical solutions used to clean equipment or treat contaminated environmental media.

Much of this waste could be recycled or salvaged for reuse rather than disposed of at landfills.

Techniques for sustainable materials management can help reduce the environmental footprint of a cleanup. EPA's *Methodology for Understanding and Reducing a Project's Environmental Footprint* specifies seven metrics associated with materials and waste, which together constitute a core element of greener cleanups.[4]



Materials & Waste: Environmental Footprint Metrics & Units of Measure
1) Refined materials used on site (tons)
2) Refined materials from recycled or waste material (percent)
3) Unrefined materials used on site (tons)
4) Unrefined materials from recycled or waste material (percent)
5) Onsite hazardous waste generated (tons)
6) Onsite non-hazardous waste generated (tons)
7) Total potential onsite waste recycled or reused (percent)

Industrial materials salvaged from demolition activities, for example, can be reused to construct new buildings and transportation systems, enhance infrastructure for water storage or drainage, or provide supplies for local agriculture, while remaining consistent with state regulations and appropriate environmental considerations.[5] Similarly, organic matter can be reused as remediation material or site restoration components, and other solid or liquid wastes can be recycled.

EPA's suite of green remediation BMPs describes specific techniques or tools to achieve a greener cleanup.[6] Opportunities to reduce the environmental footprint associated with materials and waste focus on:

- ***Purchase of greener products***, and
- ***Material reuse or recycling versus disposal***.

Purchase of Greener Products

Implementation of green remediation BMPs should begin during planning stages of a cleanup, to facilitate sustainable materials management throughout remedy construction and maintenance. Key BMPs to reduce purchasing of virgin resources include:

- Survey onsite buildings and infrastructures to determine the potential to reuse existing structures and equipment or their components as a substitute for virgin materials
- Investigate potential offsite sources such as nearby facilities that may have surplus inventory or are undergoing decommissioning, for additional substitutes
- Check for availability of needed products at local non-profit or retail centers that facilitate product reuse
- Select products that are environmentally preferable (when compared to other products serving the same purpose) with respect to raw materials consumption, manufacturing processes and locations, packaging, distribution, recycled content and recycling capability, maintenance needs, and disposal procedures
- Choose vendors with production and distribution centers near the site, to minimize fuel consumption associated with delivery
- Choose suppliers that will take back scraps or unused materials
- Design new construction to utilize standard material sizes, which minimizes excess purchasing volumes and avoids waste from custom sizing, and
- Plan new construction with future deconstruction or material reuse in mind.

EPA recommends taking advantage of existing resources to help select and purchase environmentally preferred products. The U.S. General Services Administration (GSA), for example, offers the Sustainable Facilities Tool (SF Tool), a comprehensive, online source of information and electronic links on materials for constructing and operating buildings or conducting facility activities in a sustainable way.[7] Product categories in the SF Tool's "green production compilation" area cover a range of topics, including construction materials, landscaping elements such as compost and fertilizers, cleaning products, HVAC/mechanical equipment, and non-paper office products. The tool includes a search function to identify specific items such as fencing, signage, and bioremediation materials.

Environmental programs and standards captured within the tool include the:

- Design for the Environment (DfE) Program safety screening for lower hazard products
- Biopreferred® Program for products with biobased content
- WaterSense® performance testing for water-efficient products
- Federal Energy Management Program (FEMP) for water- and energy-efficient products
- ENERGY STAR verified ratings for energy-efficient products
- Significant New Alternatives Policy (SNAP) Program for ozone-depleting chemical substitutes, and
- American National Standards Institute (ANSI), Green Seal, and other independent certification programs.

A pump-and-treat (P&T) system to treat contaminated groundwater at the ***Lawrence Aviation Site*** *on Long Island, New York, consists of equipment previously used elsewhere in the community:*

- *An air stripper salvaged from a local dry cleaning facility; the unit is equipped with two 3,000-pound filtration vessels containing reactivated (instead of virgin) carbon to treat air prior to its emission from the plant, and*
- *Two aqueous-phase carbon vessels, a vapor-phase carbon vessel, bag filters, a blower, piping, valves, connectors, pumps, and electrical wiring reclaimed from a nearby manufacturing facility undergoing upgrades.*

Construction of a building to house the P&T system involved use of greener products and salvaged construction materials:

- *Lumber from a Certified Green Dealer™ lumberyard and wood certified under the Sustainable Forestry Initiative® or Program for Endorsement of Forest Certification*
- *Low-maintenance, insect- and weather-resistant composite siding made of sustainable materials with low toxicity, such as wood pulp, cement, and sand*
- *Spray-foam insulation made of renewable resources (soybeans) and through processes involving no formaldehyde, petroleum, asbestos, fiberglass, or volatile organic compounds*
- *Common-area flooring made of rapidly renewable cork, with an underlayment of post-consumer recycled granulated rubber from tires*
- *Light-reflective ceiling tiles comprising 45% rapidly renewable resources and 23% recycled content*
- *Cabinetry, hurricane shutters, and exterior doors made of remnant framing lumber instead of virgin wood, and*
- *Landscape mulch containing chipped wood from selected onsite trees requiring removal before remedy construction.*



During construction, 240 tons of soil requiring excavation was transferred and stockpiled at a nearby municipal property for use by the Port Jefferson Highway Department. Prior to transfer, analytical tests were conducted on the soil to assure no residual contamination.

Material Reuse or Recycling Versus Disposal

Green remediation BMPs to facilitate sound planning for material reuse or recycling include:

- Check with applicable state agencies and local authorities to assure acceptable reuse of non-routine waste material or of industrial materials salvaged during construction and demolition (C&D)
- Screen local recyclers and waste haulers to identify organizations that will handle materials in an environmentally responsible manner, including suitable transportation methods and waste destinations, and
- Evaluate environmental or other trade-offs involved in onsite reuse of materials versus shipment offsite for reuse and/or recycling; evaluations can range in level of effort from qualitative comparisons of options to more rigorous quantification of alternative outcomes.[4]

Sustainable materials management can be facilitated through specific procurement practices for cleanup services, including subcontracts; for example:

- Include a requirement for reuse and recycling of all uncontaminated C&D material in documents such as requests for proposals and bid specifications
- Specify materials management goals in documentation such as construction waste management plans
- Develop a plan and reporting format to routinely track materials reuse/recycling and disposal, and
- Consider performance-based service contracts that can additionally motivate cleanup contractors and subcontractors to maximize material reuse/recycling.

EPA's **Greener Cleanups: Contracting and Administrative Toolkit** *provides sample contract language and criteria for sustainable materials management in EPA regions.*[8]

EPA recommends implementing additional BMPs during remedy construction, which may include demolition of existing structures:

- Divert at least 50% (by weight) of the uncontaminated C&D materials generated at the site, and include this goal in the site waste management plan
- Implement deconstruction techniques that involve preserving useable portions of existing structures, dismantling unusable parts for optimized transport, and recovering clean materials
- Salvage and sort clean materials with potential value for onsite reuse, recycling, resale, or donation
- Link a deconstruction project with a current construction or renovation project to facilitate material reuse
- Use crushed concrete as a construction aggregate for road base, pipe bedding, or landscaping
- Use concrete containing secondary cementitious materials to displace a portion of traditional Portland cement
- Use reclaimed asphalt pavement as a granular base for new roads
- Use shredded scrap tires, crushed concrete, and other onsite clean hard materials in place of borrow for fills
- Salvage uncontaminated and pest- or disease-free organic debris for use as infill or mulch as needed
- Optimize product ordering, to prevent purchase and delivery of excess materials, and
- Post onsite signage to designate collection points for routine recycling of single-use items such as metal, plastic, and glass containers, paper and cardboard, and other items that may be locally recyclable.

A comprehensive list of tools and resources for sustainable materials management decision-making is available in EPA's **Sustainable Materials Management in Site Cleanup** *engineering issue paper.*[9] *The information focuses on materials reuse and recycling and addresses topics such as:*

- *Locating C&D recyclers and material exchange networks*
- *State program requirements and beneficial use of materials*
- *Environmental benefits of diverting materials from landfills.*

Sustainable materials management, whether focused on greener product selection or waste reduction techniques, also applies to methods for treating contaminated soil, sediment, or groundwater. For example, the following BMPs may be used for remedy operation and maintenance:

- Use reconstituted reactive media whenever feasible; for example, regenerated rather than virgin granular activated carbon (GAC) can be used in carbon treatment beds or canisters
- Consider non fossil fuel-based substitutes as reactive media, such as locally available coconut shell-derived GAC rather than coal-based GAC
- Explore innovative technology enabling recycling or resale of extracted chemicals; for example, cryogenic compression and condensation processes can enable recovery of hydrocarbon from air stripping condensate[10]
- Maximize use of industrial materials (in ways consistent with agronomic and environmental constraints) such as iron and steel foundry sands, dry wall, flue gas desulfurization (FGD) gypsum, and non-synthetic compost for soil amendments and manufactured soils; FGD gypsum can also serve effectively in flow-through curtains to mitigate phosphorous transport to surface and groundwater
- Use periodic optimization evaluations as opportunities to incorporate industrial material recycling practices and to switch to newer green products, and
- Use continuous process monitoring techniques to maximize capacity of a treatment medium and minimize frequency of treatment media replacement or replenishment.

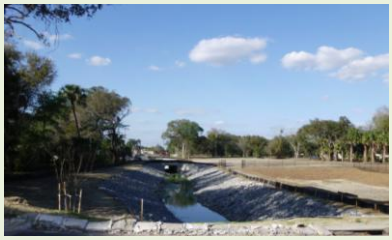
A range of industrial materials may exist as waste at sites undergoing cleanup. Conversely, industrial materials can effectively contribute to site cleanup. EPA's ***Industrial Materials Recycling*** *website provides more information on recycling and beneficial use of industrial materials such as C&D materials, coal combustion products, foundry sand, and iron and steel slag.*[5]

Cleanup at the ***Sanford Gasification Plant*** *in Seminole County, Florida, incorporated a sustainable materials management plan involving extensive reuse or recycling of onsite materials; minimized offsite disposal of excavated materials; and overall reductions in consumption of water and fossil fuels. The implemented BMPs and associated results included:*

- *Screened clean versus contaminated soil through a "cut line" investigative approach and segregated soils accordingly, which minimized the soil treatment load while averting import of 1,600 cubic yards of non-native soils for site restoration*
- *Used granulated blast furnace slag in lieu of a portion of the cement specified in the typical formula used to stabilize coal tar-contaminated soil, avoiding 13,700 tons of carbon dioxide (CO_2) otherwise emitted by thermal reactions during mixing of cement with other reagents*
- *Chipped and sent 5,000 cubic yards of extracted trees and stumps to local landscapers for use as mulch, avoiding shipment of 800 tons of material to landfills*
- *Installed a solar-powered backup energy system for perimeter air monitoring during remedy construction*
- *Reused 3.7 million gallons of water from onsite dewatering operations in the soil stabilization process*
- *Used B20 (20% biodiesel) to operate diesel vehicles and machinery, averting 177 tons of CO_2 emissions, and*
- *Procured 75% of the remedial labor and supplies (valued at $8 million) from local sources within 50 miles of the site.*



A gravity drain network overlaying recycled concrete was used to divert 500 feet of an onsite creek during remedy construction, which reduced use of diesel pumps.



The stabilization project involved extensive use of recycled concrete serving as riprap to armor the creek bed and limit erosion.

Materials and Waste Management: Recommended Checklist

Purchase of Greener Products

- ✓ Explore options for reusing materials onsite or available from local sources
- ✓ Purchase from local vendors who accept unused materials upon project completion
- ✓ Design for optimized product sizing and product ordering and for future reuse or repurposing
- ✓ Choose environmentally preferable products

Material Reuse or Recycling Versus Disposal

- ✓ Verify acceptable reuse of C&D materials with regulators
- ✓ Screen recyclers and waste haulers
- ✓ Evaluate environmental trade-offs
- ✓ Specify requirements and goals in service contracts
- ✓ Salvage uncontaminated demolition and other materials with value for reuse/recycling, resale, or donation
- ✓ Use onsite or offsite industrial materials such as crushed concrete and shredded scrap tires for remedy construction
- ✓ Recycle routine single-use items regularly
- ✓ Minimize direct or indirect use of fossil fuels during activities such as product purchasing or waste transfer
- ✓ Plan treatment process optimization and monitoring that includes sustainable materials management

References [Web accessed: December 2013]

1 U.S. EPA; *Principles for Greener Cleanups;* August 27, 2009; http://www.epa.gov/oswer/greenercleanups

2 U.S. EPA; *Sustainable Materials Management: The Road Ahead*; EPA 530-R-09-009; June 2009

3 U.S. EPA; *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*; EPA 530-R-09-017; September 2009

4 U.S. EPA; *EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint*; EPA 542-R-12-002; February 2012; http://www.cluin.org/greenremediation/methodology/docs/GC_Footprint_Methodology_Feb2012.pdf

5 U.S. EPA; Industrial Materials Recycling; http://www.epa.gov/osw/conserve/imr/

6 U.S. EPA; *Green Remediation Best Management Practices: Fact Sheets on Specific Remedies and Other Key Issues;* http://www.cluin.org/greenremediation/docs/GR_factsheet_topics.pdf

7 GSA; Sustainable Facilities Tool; http://www.sftool.gov/learn

8 U.S. EPA; *Greener Cleanups Contracting and Administrative Toolkit*; http://www.cluin.org/greenremediation/docs/Greener_Cleanups_Contracting_and_Administrative_Toolkit.pdf

9 U.S. EPA; *Sustainable Materials Management in Site Cleanup*; EPA 542-F-13-001; March 2013; http://www.clu-in.org/greenremediation/docs/materials_management_issue%20paper.pdf

10 U.S. EPA; *Technology News and Trends*; Cryogenic Compression and Condensation Process Used for Hydrocarbon Recovery; EPA 542-N-10-004; August 2010

The Agency is publishing this fact sheet as a means of disseminating information regarding the BMPs of green remediation; mention of specific products or vendors does not constitute EPA endorsement.

Visit **Green Remediation Focus** online:
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United States Environmental Protection Agency

Office of Land and Emergency Management (5203)
EPA 542-F-23-002 November 2023 Update

Green Remediation Best Management Practices: Waste Cover Systems and Integrated Site Reuse Planning

A fact sheet about the concepts and tools for using best management practices to reduce the environmental footprint of activities associated with assessing and remediating contaminated sites

www.clu-in.org/greenremediation

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The U.S. Environmental Protection Agency (EPA) *Principles for Greener Cleanups* outline the Agency's policy for evaluating and minimizing the environmental footprint of activities involved in cleaning up contaminated sites.[1] Best management practices (BMPs) of green remediation involve specific activities to address the core elements of greener cleanups:

- Reduce total energy use and increase the percentage of energy from renewable resources.
- Reduce air pollutants and greenhouse gas (GHG) emissions.
- Reduce water use and preserve water quality.
- Conserve material resources and reduce waste.
- Protect land and ecosystem services.



BMPs focused on the core elements involving use of renewable energy, green infrastructure or carbon sequestering vegetation during site cleanup and restoration also may help mitigate and adapt to ongoing climate change.

Overview

Remediation at thousands of sites across the United States involves addressing hazardous waste from former industrial landfills, aged municipal landfills, illegal dumps or waste piles. A final cover system is commonly installed in these areas as part of proper closure to serve as a surface barrier that contains the source material, reduces contaminant exposure pathways or migration, and manages associated risk. A cover (cap) is typically used where:

- A hazardous, municipal or co-disposal landfill is being reclaimed under the Resource Conservation and Recovery Act (RCRA).
- An existing unit such as a closed impoundment has been designated as a consolidation area or a decision is made to build a new onsite landfill.
- Direct contact with the waste or its leaching to groundwater poses a risk.

Landfills built to contain hazardous wastes are governed by Subtitle C of RCRA while those constructed for non-hazardous waste such as municipal solid waste (MSW) and industrial waste are covered by RCRA Subtitle D.[2] In addition to RCRA requirements, closure and capping of a landfill or former waste area may be subject to requirements of the Clean Air Act, Clean Water Act and other federal, state or local regulations. In programs such as Superfund, these regulations may be considered applicable or relevant and appropriate requirements (ARARs).

For closed landfills and other areas where waste is consolidated or otherwise left in place, conventional RCRA cover systems consist of multiple layers of impermeable materials serving as biobarriers. Controls for a conventional cover system are typically built into the system to manage contaminated liquids percolating through the disposal area (leachate) and to monitor local groundwater. Covered landfills also require controls to manage landfill gas (LFG) containing methane, carbon dioxide (CO_2) and other organic compounds that are natural byproducts of organic material decomposition. Post-closure care of a covered waste disposal unit is commonly required for 30 years; however, covers for certain types of waste may be required for much longer periods.

Alternatives to the conventional cover design may be used if they show equivalent performance in infiltration reduction and erosion resistance. One alternative design involves covers composed of asphalt or concrete. Another involves evapotranspiration (ET) covers, which rely on a thick upper layer of soil with vegetation capable of storing water until it is transpired or evaporated.



An ET cover was constructed on more than 500 acres where mining-related waste rock remains in place at the Ballard Mine Superfund site near Soda Springs, Idaho. The cover system was designed to slow the flow of stormwater runoff and limit soil erosion. Its vegetation layer enables significant sequestration of atmospheric carbon.

Green remediation BMPs can help meet sustainability and in some cases climate resilience goals associated with site cleanup projects. When properly designed and maintained, a final cover system could provide opportunities to reuse a site for purposes such as renewable energy production and greenspace preservation. Such land use may greatly benefit communities experiencing the negative impacts of environmental contamination from local sources such as aged landfills and illegal dumps.[3]

Cover System Design and Construction

Broad BMPs for designing a conventional cover system include:

- Plan to mimic rather than alter the site's natural landforms and topography wherever feasible, to preserve natural drainageways and to minimize grading that disturbs land and ecosystem services such as potable water, wildlife habitat and carbon storage.
- Integrate green infrastructure such as infiltration basins and grassed swales that filter and absorb stormwater where it lands, to bolster the site's capacity to manage stormwater.[4]
- Identify onsite sources of uncontaminated soil or sediment required for the cover's erosion control and frost prevention layers, to avoid shipping needs and associated fuel use and vehicle emissions. Similarly, uncontaminated sand, gravel and rocks from onsite instead of offsite areas can be used for drainage systems.
- Integrate onsite solar and wind resources to power the cover system's maintenance equipment such as leachate pumps and LFG flaring units.
- Account for potential effects of future climate scenarios, which could include altered site conditions such as increasing soil desiccation, water salinity, water table elevation, vulnerability to flooding, and wildlife risk.[5]

Fuel consumption by nonroad vehicles and associated emission of air contaminants typically account for a major portion of the environmental footprint of constructing a waste cover system.

Green remediation BMPs applying to site preparation include:

- Maximize use of available satellite imagery to define boundaries of waste units and operate field machinery with high "surgical" precision.
- Retrieve native, noninvasive plants existing within the waste unit boundaries and staging areas for later replanting.
- Rescue and relocate wildlife that rely on habitat within the waste unit and staging areas. Many environmental, academic or community groups offer help in conducting wildlife rescues and compiling wildlife or plant inventories.
- Substitute temporary silt fences with biodegradable erosion controls such as straw wattles and compost socks. Such devices capture sediment transported by stormwater runoff from or to adjoining slopes while building substrates for future vegetation.[6]
- Lay synthetic barriers and fluid collection systems on ground surfaces of staging areas to avoid introducing toxic materials to underlying groundwater.

BMPs applying to field activities include:

- Deploy bulldozers, graders and other nonroad vehicles or mobile equipment that meet Tier 4 emission standards.[7] This can be achieved by using newer vehicles or engines meeting the most recent emission control standards, using newer emission control components to rebuild engines, or retrofitting diesel engines with exhaust aftertreatment devices.[8]
- Implement an engine idle reduction plan to avoid fuel consumption when vehicles are not actively engaged. Options include manual shutdown after a specified time such as five minutes, engagement of automatic shutdown devices, or use of auxiliary power units to heat or cool vehicle cabs.
- Limit the speed of trucks and other onroad vehicles traversing the site to 10 miles per hour to minimize dust generation and prevent mobilization of airborne contaminants.
- Use graywater that may be available from onsite or nearby sources for purposes such as washing or steam-cleaning field vehicles or irrigating plants temporarily held outside the work zones.
- Use biobased rather than petroleum-based lubricants to operate construction vehicles. Selection of suitable biobased products may consider variables such as biomaterial sourcing, percentages of petroleum-based ingredients, and shelf life.[9]



Remediation at the 34-acre Raymark Industries, Inc. site in Stratford, Connecticut, has included constructing several waste caps above consolidated waste or waste left in place. Capping work at this National Priorities List (NPL) site currently focuses on a 14-acre area formerly used for disposal of industrial wastes. Contaminated sediment and waste excavated from other onsite locations is being consolidated at the area, and a low-permeability cap will be constructed above the consolidated material. The cap is designed to support redevelopment of the site for commercial, industrial, municipal or recreational uses.

Tier 4 emission-compliant vehicles and equipment pieces are deployed for waste excavation and capping preparation. During a representative month, the machinery included:

- Five excavators.
- Two compaction rollers.
- Two skid steers.
- One mini articulating dumper.
- Two mobile air compressors.
- Two water trucks.
- One portable generator.
- Four diesel pumps.

Green remediation BMPs applicable to cover system components and installation techniques include:

- Choose geotextile fabric and tubing composed of a high percentage of recycled materials rather than virgin materials for lining, erosion control and drainage.
- Use consumer/industrial waste such as recycled tires or ground granulated blast-furnace slag as a partial substitute for virgin materials in the construction mix required for asphalt, cement or concrete layers in a cover system.
- Choose uncontaminated crushed concrete instead of natural rock for the biobarriers or capillary breaks required in an ET cover.
- Select native drought-resistant plants for the upper vegetative layer to reduce maintenance such as irrigation.
- Preserve biodiversity by using a mix of native grasses, shrubs, and forbs in the vegetative layer.
- Install perimeter tree canopy that provides ecosystem services such as cooling, shading and enhanced stormwater control.

Integration of Site Reuse Plans

Cleanup planning and implementation can incorporate plans for future reuse of the site or selected parcels where remedial actions have been completed. Upfront integrated planning can provide economies of scale and avoid later retrofitting of remedial components if site conditions or administrative goals change over time. EPA encourages owners or operators of sites requiring waste cover installation to work closely with states and other agencies or organizations responsible for current or future oversight of the system and any site reuse. Project partners often include nonprofit groups or specialized companies.

Communities located near sites with covered waste units increasingly choose reuse options focused on increasing the site's sustainability and resilience, such as:

- Developing waste gas-to-energy systems.
- Producing electricity from onsite solar or wind resources.
- Establishing greenspace.[10]

Conventional LFG management strategies involve its destruction by way of combustion (flaring) or release to the atmosphere, depending on its content. For example, LFG from a recently closed MSW landfill with a properly operated gas collection system likely contains 40-60% methane as well as CO_2. Both are GHGs that significantly contribute to climate change. As the landfill ages, its methane generation decreases at a rate depending on the volume and type of organic waste content and site conditions such as average rainfall. In contrast, an industrial landfill or a construction and debris landfill typically emits little LFG throughout its life. Additional characteristics to consider when evaluating feasibility of waste gas-to-energy development include depth of the waste and impermeability of the cap and liner.

Cover system design and construction techniques can enhance current or future beneficial use of recovered LFG through BMPs such as:

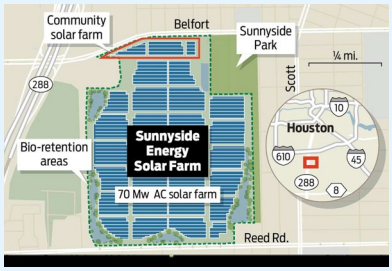
- Route the LFG to power another long-term remedial operation, such as a groundwater treatment system requiring a source of heat. LFG with a relatively low BTU value may provide about 50 percent of the heating value of natural gas.
- Route the LFG to internal combustion engines, turbines or microturbines that generate electricity for various applications. Internal combustion engines are typically the choice for LFG projects sized at 800 kilowatts (kW) and larger, while microturbines are used for smaller projects (as little as 30 kW). For example, one 30 kW microturbine can typically power one 40-hp motor. Unlike most internal combustion engines, microturbines can operate with low LFG flow or methane content.
- Divert the LFG to power non-remedial activities occurring onsite or offsite. For example, medium BTU gas could be piped to an onsite or nearby commercial facility to operate an industrial boiler.
- Use the LFG to generate combined heat and power (CHP), which can provide heat for buildings, water usage or industrial processes while producing steam to power electric generators.

Alternatively, the LFG could be processed onsite to produce high-BTU gas that can be used to fuel vehicles or injected into a gas pipeline.[11] EPA's Landfill Methane Outreach Program provides tools for exploring the recovery and beneficial use of biogas generated from organic municipal solid waste.[12]



The 154-acre Central Landfill site is located within the Central Landfill, an active municipal solid waste disposal facility in Johnston, Rhode Island. This NPL site encompasses an area formerly used to dispose of hazardous industrial wastes. Site cleanup has involved constructing a multi-layer cap and hydraulically containing and treating underlying groundwater. A gas-to-energy plant has operated at the landfill since 2013, with a current capacity of about 33 MW. The capped area, a portion of which is now buried by newer waste, has contributed up to 12 percent of the total LFG collected at the landfill.

When properly designed, waste covers can provide significant opportunities to host economic enterprises such as power production from solar and wind resources. EPA, other government agencies and developers continue to investigate the potential for reusing formerly contaminated lands and mining properties on a large-scale basis. EPA's RE-Powering America's Land initiative has tracked this potential at sites across the United States.[13] The initiative's online tools include state and national maps of renewable energy resources and feasibility studies conducted by the U.S. Department of Energy (DOE) National Renewable Energy Laboratory. Additionally, DOE technical assistance may be available to state, local and tribal governments interested in pursuing clean energy demonstrations or development projects on mine land.[14]



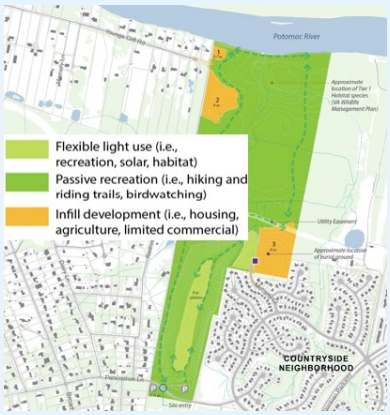
Sites that hosted landfills in the past but remain underutilized can significantly benefit from renewable energy development projects. The Sunnyside Solar Farm project in Houston, Texas, involves converting a 240-acre former landfill into a utility-scale solar farm. A community solar array also was incorporated into the project to help lower electricity costs for low-income residents in the neighborhood. The project design included bioretention areas that store and filter stormwater and help reduce local flooding.

[image credit: Houston Chronicle]

Utility-scale renewable energy production (typically rated above 1 megawatt (MW)) is often administered through a third-party power purchase agreement among the site owner, an independent developer and a utility. As with other site redevelopment efforts, the site owner may issue a request for proposals as a means to receive competitive bids on a renewable energy project meeting specific criteria. The site owner also may collaborate with partners such as local government agencies or nonprofit organizations wishing to build or expand community solar or wind projects.[15]

Integrating the designs for a cover system and a renewable energy project will help increase efficiency of each effort and conserve the natural resources directly or indirectly used for construction and later maintenance. BMPs may include:

- Account for the weight of anticipated ground-mounted photovoltaic (PV) modules, wind turbines and associated infrastructure, which could alter specifications regarding thickness of the final cover or estimates of the future settlement of waste.
- Configure underground components of the cover system, such as leachate collection or gas monitoring piping and electrical conduits, in manners that readily enable testing or potential repair of pieces in proximity to ground mountings.
- Account for maintenance activities required for the renewable energy systems, such as periodic inspections or intermittent snow removal.
- Specify low-maintenance substrates to be used in the top layer of the final cover, to minimize activities such as mowing around ground mountings.
- Account for potential effects on stormwater management due to surface grading and introduction of impervious concrete ballasts and pads.
- Provide for grid interconnection that allows temporary disconnection from the grid and direct use of the energy output during emergencies such as grid outages.
- Include infrastructure for onsite storage of electricity that may be routinely or intermittently accessed for onsite use or routed to a local microgrid.



Cleanup at the Hidden Lane Landfill NPL site in Sterling, Virginia, includes landfill cap repair; excavation and offsite disposal of contamination source material; and in situ bioremediation and chemical reduction of source material in bedrock. To inform site cleanup and redevelopment planning, a survey was taken during site investigations to gauge community interest in potential reuse of the property after remedy construction is complete. Options based on site suitability and local land use include passive recreation as well as light use such as solar energy development or nature conservation.

Waste covers also can provide significant opportunities to host greenspace that offers:

- Wildlife and habitat preservation and biodiversity.
- Recreational opportunities such as trails for hiking or centers for outdoor athletics.
- Environmental education or nature initiatives such as native seed harvesting.

Collaborative consideration of anticipated greenspace during design and construction of a cover system helps avoid later reconstruction activities and associated natural or financial resource expenditures by the site owner or a designated sponsor. Relevant green remediation BMPs commonly include:

- Specify contiguous swaths of vegetated areas to be reestablished without structures such as service buildings that can present physical barriers to natural plant propagation, site drainage and wildlife passage.
- Use pervious rather than impervious materials to surface required access roads and walkways, which fosters natural infiltration of rain or snowmelt.
- Incorporate plant species that promote colonization of bees and other pollinators.
- Integrate cobble biota barriers to prevent burrowing animal damage to synthetic liners or low permeability layers.
- Seed or install native rather than non-native plant species, which typically increases the rate of plant survival and minimizes the need for soil or plant inputs.

Cover System Maintenance and Monitoring

A final cover typically requires monitoring and maintenance of any liners, leachate collection and removal systems, leak detection systems, and gas collection systems to protect the surrounding environment and population from releases of hazardous constituents. Green remediation BMPs applicable to cover system maintenance and monitoring may include:

- Use remotely controlled or non-invasive techniques to avoid cover damage and minimize field visits. For example, open path spectroscopy can be used to periodically check for escaping LFG.
- Install onsite structures to capture rainfall as a source of water for work such as rinsing field equipment.
- Install small-scale solar panels to power auxiliary equipment such as weather stations.
- Minimize the frequency of grass mowing, to protect ground-nesting birds, avoid noise pollution, and reduce fuel consumption and associated air emissions.
- Conduct periodic prescribed burns, which help maintain a site's native vegetation, prevent growth of invasive plant species, and reduce fuel for potential wildfires.
- Use controlled animal grazing to eliminate woody growth and control vegetation height while adding organic matter to the soil.
- Substitute chemical fertilizers, herbicides or pesticides with non-synthetic soil and plant inputs such as compost.
- Use integrated pest management methods such as removing overgrown vegetation and standing water.[16]



Six ET covers across 450 acres and two landfill covers across 84 acres were constructed at the Rocky Mountain Arsenal in Commerce City, Colorado. Maintenance of the covers and surrounding prairie grasslands of the Rocky Mountain Arsenal National Wildlife Refuge includes periodic prescribed burns. About 100 acres of the site were deeded to Commerce City for use as a stormwater retention area and open space. An associated conservation easement reserves the acreage's conservation values in perpetuity.[17]

Information about additional BMPs that can help reduce the environmental footprint of long-term monitoring is available in EPA's companion fact sheet, *Green Remediation Best Management Practices: Site Investigation and Environmental Monitoring*.[18]

References

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2 U.S. EPA. Basic Information about Landfills. https://www.epa.gov/landfills/basic-information-about-landfills#whatis
3 U.S. EPA. EJScreen: Environmental Justice Screening and Mapping Tool. https://www.epa.gov/ejscreen
4 U.S. EPA. Green Infrastructure. https://www.epa.gov/green-infrastructure
5 U.S. EPA. Superfund Climate Resilience. https://www.epa.gov/superfund/superfund-climate-resilience
6 General Services Administration. Sustainable Facilities Tool. Green Procurement Compilation. Erosion Control Materials. https://sftool.gov/greenprocurement/green-products/1/construction-materials/1347/erosion-control-materials/0
7 U.S. EPA. Regulations for Emissions from Heavy Equipment with Compression-Ignition (Diesel) Engines. https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-heavy-equipment-compression
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10 U.S. EPA. *Reuse Opportunities at Capped Superfund Sites*. April 2017. https://semspub.epa.gov/work/HQ/196748.pdf
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13 U.S. EPA. RE-Powering America's Land. https://www.epa.gov/re-powering
14 U.S. DOE. Clean Energy Demonstration Program on Current and Former Mine Land. https://www.energy.gov/oced/clean-energy-demonstration-program-current-and-former-mine-land
15 U.S. EPA. Green Power Markets. Shared Renewables. https://www.epa.gov/green-power-markets/shared-renewables
16 U.S. EPA. Introduction to Integrated Pest Management. https://www.epa.gov/ipm/introduction-integrated-pest-management
17 U.S. EPA. Superfund. Climate Adaptation Profile: Rocky Mountain Arsenal. https://www.epa.gov/superfund/climate-adaptation-profile-rocky-mountain-arsenal
18 U.S. EPA. *Green Remediation Best Management Practices: Site Investigation and Environmental Monitoring*. EPA 542-F-16-002. September 2016. https://clu-in.org/greenremediation/docs/GR_Fact_Sheet_SI&EM.pdf

This fact sheet provides an update on information compiled in the December 2011 "Best Management Practices: Landfill Cover Systems & Energy Production" fact sheet (EPA 542-F-11-024), in collaboration with the Greener Cleanups Subcommittee of the U.S. EPA Technical Support Project's Engineering Forum.

To view BMP fact sheets on other topics, visit CLU-IN Green Remediation Focus: www.clu-in.org/greenremediation.

Climate Screening Checklist

Background Information

- Project Manager:
- Site Name:
- Site Number:
- Site Location:
- Site Elevation (average above sea level):
- ClimAID Region (Responding Climate Change in New York State (ClimAID) - NYSERDA):
- Remedial Stage/site classification:

- Contamination - Media Impacted/ Contaminants of Concern:

- Proposed/Current Remedy:

- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?

- Is the site in proximity to any sensitive receptors? (e.g. wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.)

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

☐ **Yes** ☐ **No**

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐ **Yes** ☐ **No**

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☐ **Yes** ☐ **No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Reference data source/Model)[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation				
Temperature[2] (Extreme Heat or Cold Weather Impacts)				
Sea Level Rise				
Flooding				
Storm Surge				
Wildfire				
Drought				
Storm Severity				
Landslides				
Other Hazards:				

* Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 0 degrees F (NYSERDA ClimAID report)

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

Required Next Steps (If no further action is required, provide justification):

Potential Data Sources (not an exhaustive list)- from Superfund Climate Resilience: Vulnerability Assessment | US EPA

NYSERDA ClimAID report- Responding Climate Change in New York State (ClimAID) - NYSERDA

FEMA- National Flood Hazard Layer | FEMA.gov

NOAA- National Storm Surge Risk Maps - Version 3 (noaa.gov)

Department of Agriculture Forest Service Wildfire Risk to Communities

EPA Climate Change Indicators in the United States

EPA Climate Resilience Evaluation & Awareness Tool (CREAT) | U.S. Climate Resilience Toolkit

EPA National Stormwater Calculator

National Integrated Drought Information System U.S. Drought Portal

National Interagency Coordination Center National Interagency Fire Center

National Oceanic and Atmospheric Administration Coastal Services Digital Coast

- Resources to help communities assess coastal hazards, such as the Sea Level Rise Viewer for visualizing community-level impacts of flooding or sea level rise and downloadable LIDAR data

National Oceanic and Atmospheric Administration National Centers for Environmental Information website

National Oceanic and Atmospheric Administration Sea Level Trends

National Weather Service Climate Prediction Center

National Weather Service National Hurricane Center

National Weather Service Sea, Lake, and Overland Surges from Hurricanes (SLOSH)

National Weather Service Storm Surge Hazard Maps

U.S. Federal Government Climate Resilience Toolkit: The Climate Explorer

U.S. Army Corps of Engineers Climate Prepardness and Resilience

U.S. Geological Survey Coastal Change Hazards Portal

U.S. Geological Survey Landslide Hazards Program

U.S. Geological Survey National Ground-water Monitoring Network Data Portal

U.S. Geological Survey National Climate Change Viewer

U.S. Geological Survey National Water Dashboard

U.S. Geological Survey StreamStats

NYS Department of State- Assess | Department of State (ny.gov)

NYSERDA NY Costal Floodplain Mapper- Home Page (ny.gov)

NYSDEC Costal Erosion Hazards- Coastal Areas Regulated By The CEHA Permit Program - NYDEC

NYSDOH Heat Index- health.ny.gov/environmental/weather/vulnerability_index/county_maps.htm

Climate Screening Checklist -- Example

Background

- Project Manager: Brianna Scharf
- Site Name: Kliegman Brothers, OU1 (on-site) and OU2 (off-site)
- Site Number: 241031
- Site Location: 76-01 77th Avenue Queens, NY
- Site Elevation (average above sea level): Approximately 86 feet above sea level (from google earth).



- ClimAID region: Region 4—New York City and Long Island



- Remedial Stage/Site Classification: Site Management- Class 4

- Contamination -- Media Impacted/Contaminants of Concern:

- Soil, Vapor Intrusion/Indoor Air, Groundwater- COCs: TCE, PCE, Vinyl Chloride

- Proposed/Current Remedy: Remediation completed, use of ISCO off-site and off-site SSDs, on-site SVE system, Institutional Controls (Easement)

- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?
  - ~20 years, yes, the remedy has remained in place for 10+ years, ROD issued in 2006 SVE system is still present on the site (2024)

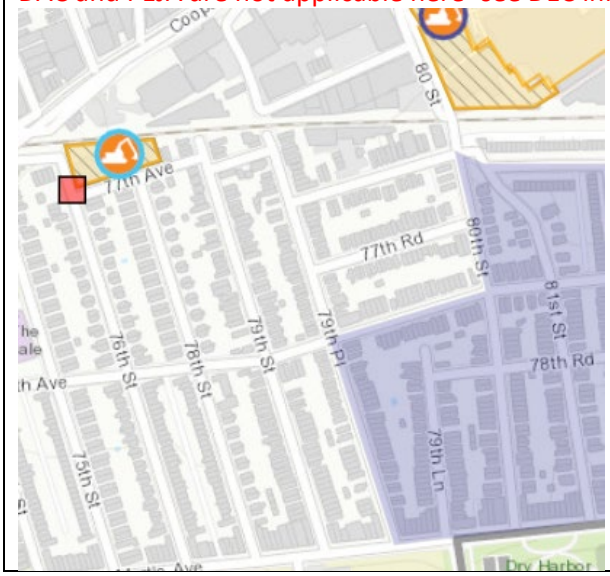
Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

☐ **Yes** **x No**

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐ **Yes** **x No**

DAC and PEJA are not applicable here- see DEC info Locator



Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☐ **Yes** **x No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location (Y/N/NA)** [1]	**Projected Change (**Put the reference document/model used here) [3]	**Potential to Impact Remedy (Y/N)**	**Is remedy/site already resilient? (Y/N)** [4]
Precipitation	Potentially	N- Based upon (Resilience Analysis and Planning Tool (RAPT) (arcgis.com))	N/A	N/A
Temperature (Extreme Heat or Cold Weather Impacts) [2]	Y	Y	Y	Y – Following screening, modified remedy to include a telemetry system for any power shortages, telemetry system provides remote monitoring and notifications for system during periods of power supply outages
Sea Level Rise	N	N/A- If applicable use (NOAA Sea Level Rise tool)-	N/A	N/A
Flooding[5]	Potentially	N (FEMA National Flood Hazard Mapping - FEMA- National Flood Hazard Layer | FEMA.gov)	N	N- modified remedy to include a telemetry system for any power outages if flooding were to occur
Storm Surge	N	N/A (NOAA)	N/A	N/A
Wildfire	N	N/A ((Resilience Analysis and Planning Tool	N/A	N/A

		(RAPT) (arcgis.com))		
Drought	N	N/A- If not N/A (Home | Drought.gov)- this was based upon regional information	N/A	N/A
Storm Severity (could include high winds, lightening, etc.)	Y	Y ((Resilience Analysis and Planning Tool (RAPT) (arcgis.com))	Y	Y – modified remedy to include a telemetry system for any power shortages
Landslides	N	N/A	N/A	N/A
Other Hazards:	Seismic Activity	(Resilience Analysis and Planning Tool (RAPT) (arcgis.com))	Y	Y—modified to include a telemetry system

*Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 30 degrees F (NYSERDA ClimAID report), Note: this is important for sites with active remedial systems/sites where the remedy relies on the electrical grid

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

[5] For system sites- components (e.g. electrical wiring and panels) should be evaluated to determine if they would need to be raised to avoid flooding.

Required Next Steps (If no further action, provide justification):

No further actions at this time, severe weather storm inspection should continue to be conducted. The vulnerability that was assessed was the missing telemetry system on the SVE which has subsequently been installed.