Site Characterization Work Plan

6 Old River Road
Glenmont, NY
(Site No. 401088)

New York State Department of Environmental Conservation
Standby Contract No. D009803, Work Assignment 60

Project number: 60770465

February 11, 2026

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1. Introduction

AECOM USA, Inc. (AECOM) is pleased to submit this Site Characterization Work Plan (SCWP) for 6 Old River Road (Site) as requested by the New York State Department of Environmental Conservation (NYSDEC) under Standby Contract No. D009803, Work Assignment (WA)-60. The Site is located at 6 Old River Road in Glenmont, Albany County, New York (Tax ID: 98.01-3-18). **Figure 1** presents the Site Location Map, **Figures 2** and **3** present the Site Characterization Proposed Sampling Locations.

The 2.70 acre Site is located in Glenmont, Town of Bethlehem, just south of the port of Albany. The Site lies within a rural, light industrial zoning district extending to the north and south of the Site location, with commercial and residential properties present to the north, east and west. CSX railroad tracks border the east side of the Site, separating it from the Beacon Island fly ash landfill. The Hudson River borders the landfill to the east. The Site contains an approximately 14,000-square-foot warehouse, built in 1950, connected to a private supply water supply well and septic system. The building is currently occupied by a commercial fertilizer and road de-icing products processing facility, and the Site was previously occupied by a kitchen tile showroom and a motorcycle products wholesaler and distributor. No approximate dates for the transitions between the businesses are available.

The scope of work described in this SCWP includes the following field activities:

- Soil boring advancement;
- Surface/subsurface soil sampling;
- Overburden monitoring well installation;
- Water level measurement and non-aqueous phase liquid (NAPL) thickness measurement, if present;
- Groundwater sampling;
- Sub-slab vapor pin installation; and,
- Sub-slab vapor and ambient air sampling.

2. Site Description and Background

2.1 Site History

The Site formerly operated as a ceramic kitchen tile showroom, as well as a motorcycle supply shop. It is currently unknown when the businesses at the Site transitioned; however, the current owner has owned the property for approximately 40 years. NYSDEC Spill #2401808 was reported in relation to the results of a Focused Phase 2 Environmental Site Assessment (ESA) performed by Hanson Van Vleet Hydrogeologic Consultants, PLLC (Hanson Van Vleet) performed at the Site in 2024 [Appendix E (of the SCWP)]. Preliminary findings from the report indicate the presence of Chlorinated Volatile Organic Compounds (CVOCs) in an onsite private water supply well. Detected compounds include cis-1,2-dichloroethene, trichloroethene, vinyl chloride, and 1,2-dichloroethane.

2.2 Geology / Hydrogeology

The New York State Geological Survey (NYSGS) classifies the surficial materials near the Site as bedded fine sand, silt, and clay of highly variable thickness, based on its 2016 map *Surficial Geology of the Delmar Quadrangle, Albany County, New York*. Overburden deposits at the Site are anticipated to be alluvial deposits and glacial till composed of fine sands, silts and clay at undetermined depths beyond 20 feet below ground surface (bgs). The Focused ESA performed by Hanson Van Vleet indicates the

subsurface material predominately consists of clayey soils, but the thickness of the subsurface material remains unknown. Beneath the glacial till, bedrock geology is anticipated to be from the Helderberg and Austin Glen Formations. Provisionally, the general groundwater flow direction is to the east, towards the Hudson River; additional groundwater measurements collected during this Site Characterization Investigation may refine or confirm this presumed groundwater flow direction as new data becomes available. The Focused ESA performed at the Site indicates depth to groundwater is approximately 10 feet bgs.

2.3 Remaining Contamination

Preliminary findings from the Focused ESA (associated with Spill #2401808) indicate the presence of CVOCs in an onsite private water supply well. Detected compounds include cis-1,2-dichloroethene, trichloroethene, vinyl chloride, and 1,2-dichloroethane. However, the ESA was found to be inconclusive by the Division of Environmental Remediation (DER), with respect to the potential source and associated soil vapor intrusion impacts. Further characterization of the Site is necessary to determine the presence and locations of all total contaminants, with their concentrations.

Soil

Historical data from the Focused ESA conducted by Hanson Van Vleet indicates that soil samples collected from the west side of the property, near the property boundary and at the groundwater interface (from soil borings B-1, B-2, B-3, and B-4), showed no detectable concentrations of Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), or metals exceeding the respective laboratory method detection limits or the NYSDEC 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs).

Groundwater

Historical data from the Focused ESA conducted by Hanson Van Vleet indicates a groundwater sample was collected from temporary monitoring well B-3 (located on the west side of the property) and was analyzed for VOCs per Environmental Protection Agency (EPA) Method 8260 STARS, SVOCs per EPA Method 8270 STARS and RCRA 8 Metals per EPA Methods 3050, 6010 and 7471. The groundwater sample collected from the temporary groundwater monitoring well installed in soil boring B-3 had no detectable concentrations of VOCs, SVOCs or metals exceeding the respective laboratory method detection limits and/or 6 NYCRR Part 703.

On-Site Supply Well

Hanson Van Vleet collected a sample from the on-Site water supply well as part of a Focused ESA on February 16, 2024. Deficiencies were identified during inspection of the wellhead which included inadequate casing elevation above grade surface, potentially corroded and deteriorated casing, and an inadequate well cap that does not provide a sufficient sanitary seal. Therefore, a tap was utilized for sampling of the well. The water sample was analyzed for VOCs per EPA Method 524.2, SVOCs per EPA Method 525.3, Polychlorinated Biphenyls (PCBs) per EPA Method 508, Metals per EPA Methods 200.7 and 200.8; several general wet chemistry parameters by various methods, Total Coliforms and E-Coli per Standard Method 9223B-04 and 18-Parameter Per- and polyfluoroalkyl substances (PFAS) list per EPA Method 537.1.

The Focused ESA by Hanson VanVleet showed the results of laboratory analyses of the water sample collected from the pre-existing water well identified concentrations of several CVOCs, including 1,1-Dichloroethane (1.2 ug/L), cis-1,2-Dichloroethene (14 ug/L), Trichloroethene (8.7 ug/L) and Vinyl chloride (1.3 ug/L), exceeding the laboratory method reporting limit (MRL). Of the four CVOCs that exceeded the laboratory MRL, cis-1,2-Dichloroethene and Trichloroethene were detected at concentrations which

exceed the New York State Department of Health (NYSDOH) Maximum Contaminant Level (MCL) of 5 µg/L. No other VOCs were detected at concentrations that exceed the NYSDOH MCL.

Laboratory analyses of a water sample from the pre-existing well indicated no detectable concentrations of SVOCs, consistent with the requirements of the 10 NYCRR Subpart 5-1 Drinking Water Regulations. Similarly, metals analyses showed no detectable levels of the regulated metals under these standards, though low-level detections of common naturally occurring metals were observed, all remaining below secondary drinking water standards. Wet chemistry parameter testing revealed that all measured parameters were either below detection limits or within normal ranges for drinking water, with the exception of total dissolved solids (TDS), which measured 560 mg/L, exceeding the secondary goal of 500 mg/L. Bacterial analyses detected Total Coliform, while E. coli was absent, representing an exceedance of the NYSDOH Drinking Water Standards.

Surface Water

No body of water or surface water is present within the boundaries of the Site. The Normans Kill is located approximately one-quarter mile northeast of the Site and serves as a tributary to the Hudson River. The Hudson River itself lies approximately one-quarter mile to the east of the Site, separated by the Beacon Island fly ash landfill and adjacent railroad tracks.

3. Site Characterization Work Plan

3.1 Purpose

The purpose of this Site Characterization includes, but is not limited to, the following:

- Assess the lateral and vertical extents of soil and groundwater contamination within overburden soils;
- Assess sub-slab soil vapor concentrations within the existing on-site building, as compared to indoor air and outdoor air samples, and evaluate collected data to determine whether remedial action is necessary;
- Re-evaluate the surface and subsurface characteristics of the Site, including topography, stratigraphy, hydrogeology, and depth to groundwater; and
- Identify the source(s) of contamination in environmental media within overburden, assess and evaluate the potential migration pathways, and identify actual or potential receptors of contaminants.

The locations of the proposed soil borings and monitoring wells are shown in **Figure 2** (locations may change based on physical access constraints and soil boring findings). NYSDEC will be notified prior to any recommended changes to the sampling locations. The locations of the proposed sub-slab vapor points and air samples are shown in **Figure 3**. The locations of sub-slab vapor pin installations may be modified based upon sub-slab utilities or anomalies present as indicated from the geophysical utility mark-out location. Ambient air sample locations were determined in coordination with NYSDEC and NYSDOH during an onsite meeting held on October 7, 2025. Any necessary adjustments based on field conditions will be discussed with NYSDEC and NYSDOH.

This SCWP will be used in conjunction with the Site-specific *Health and Safety Plan* [HASP, see **Appendix A (of the SCWP**)], Site-specific *Field Activity Plan* [FAP, see **Appendix B (of the SCWP**)] and Site-specific *Quality Assurance Project Plan* [QAPP, see **Appendix C (of the SCWP**)] for Work Assignments under Standby Engineering Services Contract D009803. Refer to these plans, included in the Appendices of this SCWP for descriptions of routine field procedures, field forms, and quality assurance procedures.

3.2 Scope of Work

The scope of work for the field investigation consists of the following tasks:

- Task 1 – Underground Utility Clearance
- Task 2 – Inspection of Existing Supply Well
- Task 3 – Advancement of Soil Borings and Surface/Subsurface Soil Sampling
- Task 4 – Installation of Monitoring Wells
- Task 5 – Monitoring Well Development
- Task 6 – Water Level Measurement and NAPL Thickness Measurement (if present)
- Task 7 – Groundwater Sample Collection
- Task 8 – Sub-Slab Vapor Point Installation
- Task 9 – Sub-Slab Vapor and Ambient Air Sample Collection
- Task 10 – Site Survey
- Task 11 – Investigation Derived Waste (IDW) Handling

The field investigation tasks are further described below.

3.2.1 Task 1 – Underground Utility Clearance

Prior to intrusive work described in Task 2, geophysical screening will be conducted by GPRS, Inc. to identify the presence of underground utilities or any anomalies (e.g., underground storage tanks) within the work areas where soil vapor points will be installed and where hollow stem auger (HSA) drilling will be conducted. This will be done using geophysical methods (i.e., ground penetrating radar and electromagnetic conductivity).

Prior to mobilization, the drilling subcontractor, Nothnagle Drilling, shall have the required utility clearance mark-outs necessary for commencing drilling activities at the site.

In addition, at each proposed soil boring location, the drilling subcontractor will hand clear/soft dig with a bucket auger down to 5-feet bgs. If necessary, air knifing or Vac-Tron® will be used to clear the first 5-feet.

The procedures for this task are described in Sections 2.3 through 2.5 of the Contract D009803-60 Site-specific Field Activities Plan (FAP), included as Appendix B (of the SCWP) – FAP.

3.2.2 Task 2 – Inspection of Existing Supply Well

The existing on-site supply well will be inspected with a downhole camera to visually evaluate the structural integrity of the well and assess construction details. The existing well location is depicted in Figures 2 and 3.

The procedures for this task are described in Section 4.1 of the FAP [Appendix B (of the SCWP) – FAP].

3.2.3 Task 3 – Advancement of Soil Borings and Surface/Subsurface Soil Sampling

Soil borings will be advanced by AECOM's drilling subcontractor, Nothnagle Drilling. Soil borings will be sampled at up to four (4) locations at the Site (Figure 3), using a hollow stem auger (HSA) equipped drill rig using split-spoon samplers following ASTM 1586. HSA soil borings will be advanced to 25 feet below ground surface (bgs) or until encountering refusal.

Soil sampling will be conducted continuously at two (2) foot intervals to classify subsurface material. All soil samples will be visually described and classified, inspected for signs of contamination, and screened with a photoionization detector (PID) for the presence of organic vapors by a qualified geologist. Soil

boring logs will classify soils in accordance with the Unified Soil Classification System (USCS) and display Photoionization Detector (PID) reads for each foot. Since the top five (5) feet of each soil boring will be hand-cleared, soil will be classified and documented as best as practicable.

One soil sample from each soil boring will be collected and submitted for analysis of Target Compound List (TCL) VOCs, TCL SVOCs including 1,4-dioxane, Total Analyte List (TAL) Metals including Mercury and Cyanide; TCL PCBs; TCL Herbicides/Pesticides and *Per- and Polyfluoroalkyl Substances (*PFAS). The sample analytical program is summarized in Table 1. Samples for laboratory analysis will be collected from the interval with the greatest observed potential Site-related impacts as indicated by a PID; if no potential impacts are observed, the soil sample will be collected from the interval directly above groundwater.

All four (4) of the boreholes will then be converted into overburden monitoring wells (see Task 4).

The procedures for Task 3 are described in Sections 3.0 and 5.0 of the FAP [Appendix B (of the SCWP) – FAP] . Soils will be logged following the procedures described in Section 9.0 of the FAP. Community air monitoring will be performed as described in Section 2.6 of the FAP. Additionally, PFAS procedures will follow guidance from *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs* (NYSDEC, April 2023).

3.2.4 Task 4 – Installation of Overburden Monitoring Wells

Four (4) overburden monitoring wells will be installed at the Site (Figure 2) by AECOM's drilling subcontractor Nothnagle Drilling.

As described in Task 3, overburden soil will be visually described and classified, inspected for signs of contamination, and screened with a PID for the presence of organic vapors by an AECOM geologist. All soil cuttings and drilling water will be contained in Department of Transportation (DOT) approved 55-gallon drums. All monitoring wells, and soil borings will be surveyed for horizontal and vertical control.

The procedures for Task 4 are described in Sections 4.3 of the FAP [Appendix B (of the SCWP) – FAP]. Soils will be logged following the procedures described in Section 5.1 of the FAP.

Four (4) monitoring wells will be constructed with 10-feet of 2-inch ID #10 slot polyvinyl chloride (PVC) screen attached to a 2-inch inner diameter (ID), Schedule 40 PVC riser to the ground surface and a 1-foot sump Schedule 40 PVC at the bottom. The well screen will straddle the water table. If bedrock is encountered below the water table, but prior to 25 feet bgs, drilling will cease, and the well shall be screened at a depth that straddles the water table above the bedrock interface, as directed by the AECOM geologist.

Each overburden monitoring well shall be finished with a flush mount curb box with locking covers.

3.2.5 Task 5 – Monitoring Well Development

All monitoring wells to be sampled will be developed by AECOM following the procedures described in Section 4.4 of the FAP [Appendix B (of the SCWP) – FAP].

3.2.6 Task 6 – Water Level Measurement

A comprehensive round of water levels will be measured from the new overburden monitoring wells and the on-site supply well by AECOM. If present, NAPL thickness will be measured. The procedures for Task 6 water level and NAPL thickness measurement are described in Sections 4.2 of the FAP [Appendix B (of the SCWP) – FAP].

3.2.7 Task 7 – Groundwater Sample Collection

Two rounds of groundwater samples will be collected from newly installed overburden monitoring wells, and from the on-site supply well by AECOM. Samples will be collected using low-flow sampling procedures and will be analyzed for TCL VOCs, TCL SVOCs (including 1,4-dioxane), TAL Metals

(including Mercury and Cyanide), PCBs, Pesticides/Herbicides, and PFAS. The sample analytical program is summarized in Table 1.

The second round of groundwater sampling will be performed approximately 90 days after the initial round, with samples anticipated to be analyzed only for TCL VOCs by EPA Method 8260D; which may be subject to revision depending on the results determined from the first groundwater sampling event.

Proposed well locations can be found in Figure 2. Groundwater samples will be collected using the procedures described in Section 4.5.1 and 4.5.2 of the FAP. Additionally, PFAS procedures will follow guidance from *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs* (NYSDEC, April 2023).

3.2.8 Task 8 – Sub-Slab Vapor Point Installation

Four (4) sub-slab soil vapor pin sampling points will be installed within the interior of the existing building (Figure 3). The installation of sub-slab vapor pins will be performed by AECOM using handheld drill with a 1-inch coring bit. Each vapor pin will be sealed and tested for integrity using the helium shroud testing method as described in Section 6.0 and Appendix C (of the FAP) -Vapor Pin Procedures.

3.2.9 Task 9 – Sub-Slab Vapor and Air Sample Collection

Prior to sub-slab and indoor air sampling, a comprehensive indoor air quality questionnaire and building inventory will be conducted as per NYSDOH guidance, to identify possible interferences with the indoor air and sub-slab sampling results assessment.

Four (4) sub-slab soil vapor samples, with four (4) concurrent indoor ambient air samples will be collected from inside the existing building by AECOM. In addition, AECOM will collect one indoor air sample from the office area above the crawl space within the building, while one outdoor air sample will be collected to establish background conditions. Proposed sampling locations can be found in Figure 3. A total of 10 soil vapor and air samples will be collected and analyzed for the Target Compound List (TCL) VOCs by a NYSDEC Call-out laboratory (Pace Analytical) following EPA Compendium Method TO-15, Determination of VOCs in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). The sample analytical program is summarized in Table 1.

Vapor samples, including sub-slab, indoor air, and outdoor air, will be collected using 6-liter Summa® canisters over a 24-hour period at a flow rate of 3.2–3.4 milliliters per minute (mL/min). Flow rates for both purging and collecting should not exceed 200mL/min or 0.2 liters per minute (L/min) to minimize outdoor air infiltration during sampling. Indoor air samples will be co-located with sub-slab vapor sampling points and collected three feet above the floor, while the outdoor air sample will be placed five feet above the ground in a secure, upwind location, with adjustments discussed with NYSDEC/NYSDOH if needed. A blind field duplicate will be collected at a rate of 1 per 20 samples, and all canisters will be sealed and shipped to a certified laboratory with verified-clean certifications for analysis. AECOM will maintain a sample and photo log for each location to ensure proper documentation and compliance with NYSDOH and NYSDEC guidelines.

Air sample locations have been determined in coordination with NYSDEC and NYSDOH during the onsite meeting held on October 7, 2025. Proposed sub-slab vapor sample and air sample locations can be found in Figure 3.

3.2.10 Task 10 – Site Survey

AECOM's site survey subcontractor, KHEOPS Architecture, Engineering and Survey DPC, will survey sampling locations and key site features at the Site. This will include monitoring well locations, soil borings, other relevant Site features, ground surface locations, and top of casing (TOC) elevations. Data from this survey will be used in generating the Site Characterization Report discussed below.

3.2.11 Task 11 – Investigation Derived Waste Handling

Investigation-derived waste (IDW) generated during the field activities will be handled using the procedures described in Section 7.2 of the FAP [Appendix B (of the SCWP) – FAP].

One soil and one aqueous sample from IDW will be collected and submitted for laboratory analysis of waste characterization parameters as indicated on Table 1.

Following waste characterization, IDW will be transported off-Site under manifest by Momentum Environmental Services, LLC, for proper disposal.

3.3 Site Characterization Report Preparation

The Site Characterization Investigation Report will be submitted as a draft report within 90 days after all fieldwork has been completed and data have been received and validated. Data will be validated in accordance with *Division of Environmental Remediation (DER)-10, Technical Guidance for Site Investigation and Remediation, Appendix 2B - Guidance for Data Deliverables and the Development of Data Usability Summary Reports* (NYSDEC, 2010).

A final version of the report will be submitted within two weeks after NYSDEC's comments on the draft report are received by AECOM.

The report for this task will include the following:

a. A description of all field activities conducted by AECOM and its subcontractors on the Site;

b. A summary of previous investigations;

c. A site location map;

d. Figure(s) depicting the site layout soil borings, monitoring wells, and key site features;

e. Figures depicting sample locations and NYS standards, criteria, guidance (SCG) non-compliance values from the soil, groundwater, and soil vapor/ambient air analytical data collected during site work;

f. A discussion of analytical results;

g. Tables and Figures depicting groundwater elevation and NAPL contours, and NAPL thickness (as applicable);

h. Data summary tables of detected compounds with NYS SCGs listed, and non-compliance values highlighted;

i. Field notes and/or daily activity logs;

j. Photographs taken at the site during field activities;

k. Soil boring logs;

l. Monitoring well construction logs;

m. Air canister sampling logs;

n. Monitoring well development logs with water quality measurements;

o. Monitoring well purge logs with water quality measurements;

p. Manifests and/or bills of lading signed by the disposal facility documenting the proper disposal of IDW;

q. Survey field notes and site sketches;

r. DUSR (Data Usability Summary Reports) (including Form 1s) containing only data from the current field work; and

s. Site Characterization Assessment.

This task includes EQuIS™ submittals to the NYSDEC for all analytical data collected during the investigation.

3.4 Green & Sustainable Remediation Initiative Efforts

Development of this SCWP 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). A summary of green remediation best management practices by the EPA for site investigations can be found in Appendix D (of the SCWP) – Green Remediation Best Management Practices: Site Investigation . Pursuant to the NYSDEC DER-31 Green and Sustainable Remediation (GSR) initiative, GSR principles and techniques shall be implemented to the extent feasible during site investigation, remedial and site management stages of projects under NYSDEC programs. The major GSR components are as follows:

- Considering the environmental impacts of investigative technologies 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.

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

- Vehicle idling will be reduced wherever practicable.
- GPR 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. This field task is described above in Task 1.
- Using low-flow groundwater sampling technology to reduce IDW in the form of purge water gallons and disposable sampling equipment.
- IDW drums will be grouped and stored in a secure location throughout field activities and 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.

Additional information on GSR best practices is found in Section 2.8 of the FAP [Appendix B (of the SCWP)].

3.5 General Notes

All samples will be analyzed by an NYSDEC call-out laboratory (Pace Analytical), which will be an ELAP certified lab. Proper QA/QC will be collected in accordance with the Site-specific QAPP [Appendix C (of the SCWP)] and the Sample Analytical Program, (Table 1). Category B deliverables are required for all soil and groundwater analytical data. Data validation and DUSRS will be completed by AECOM's in-house data validator.

4. Anticipated Schedule

This WA will be performed according to the following anticipated time frames:

Activity	**Date**
NYSDEC approval of 2.11 Package	December 12, 2025
Task 2: Field Work/Field Investigation Start	March 2, 2026
Task 2: Field Work/Field Investigation End	June 1, 2026
Task 3: Site Characterization Report - Draft	September 1, 2026 or 90 days after all DUSRs received from Validator
Task 3: Site Characterization Report - Final	October 1, 2026 or two weeks after comments received from NYSDEC

5. DER-10 Certification

"*I Abdiel López Torres, P.G. 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).*"

6. Closing

AECOM appreciates serving NYSDEC with this challenging and interesting project. If you have any questions or comments, please call me at (518) 951-2393.

Sincerely,



Abdiel López Torres, P.G.

Project Manager

AECOM USA, Inc.

Acronyms

AECOM	AECOM USA, Inc.
bgs	below ground surface
CVOC	chlorinated volatile compound
DER	Division of Environmental Remediation
DOT	Department of Transportation
DUSR	Data Usability Summary Reports
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FAP	Generic Field Activity Plan
GSR	Green and Sustainable Remediation
HASP	Health and Safety Plan
HSA	hollow stem augers
ID	inner diameter
IDW	investigation derived waste
MBE	Minority business enterprise
NAPL	non-aqueous phase liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
PFAS	per- and polyfluoroalkyl substances
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
Site	6 Old River Road
SC	Site Characterization
SCG	Standards, Criteria, or Guidance
SCO	soil cleanup objectives
SVOC	semi volatile organic compounds
TCL	Target Compound List
VOC	volatile organic compound
WBE	Women business enterprise

References

Hanson Van Vleet, Hydrogeologic Consultants, PLLC, 2024. Focused Phase 2 Environmental Site Assessment. March 12, 2024.

Leone, J. R., Kozlowski, A. L., and Dineen, R., 2016. Surficial Geology of the Delmar Quadrangle, Albany County, New York: New York State Geological Survey, Map and Chart Series 91, scale 1:24,000.

(NYSDEC, 2010. DER-10 / Technical Guidance for Site Investigation and Remediation, Issued May 3, 2010.

NYSDEC, 2011. DER-31 / *Green Remediation*, Issued August 11, 2010.

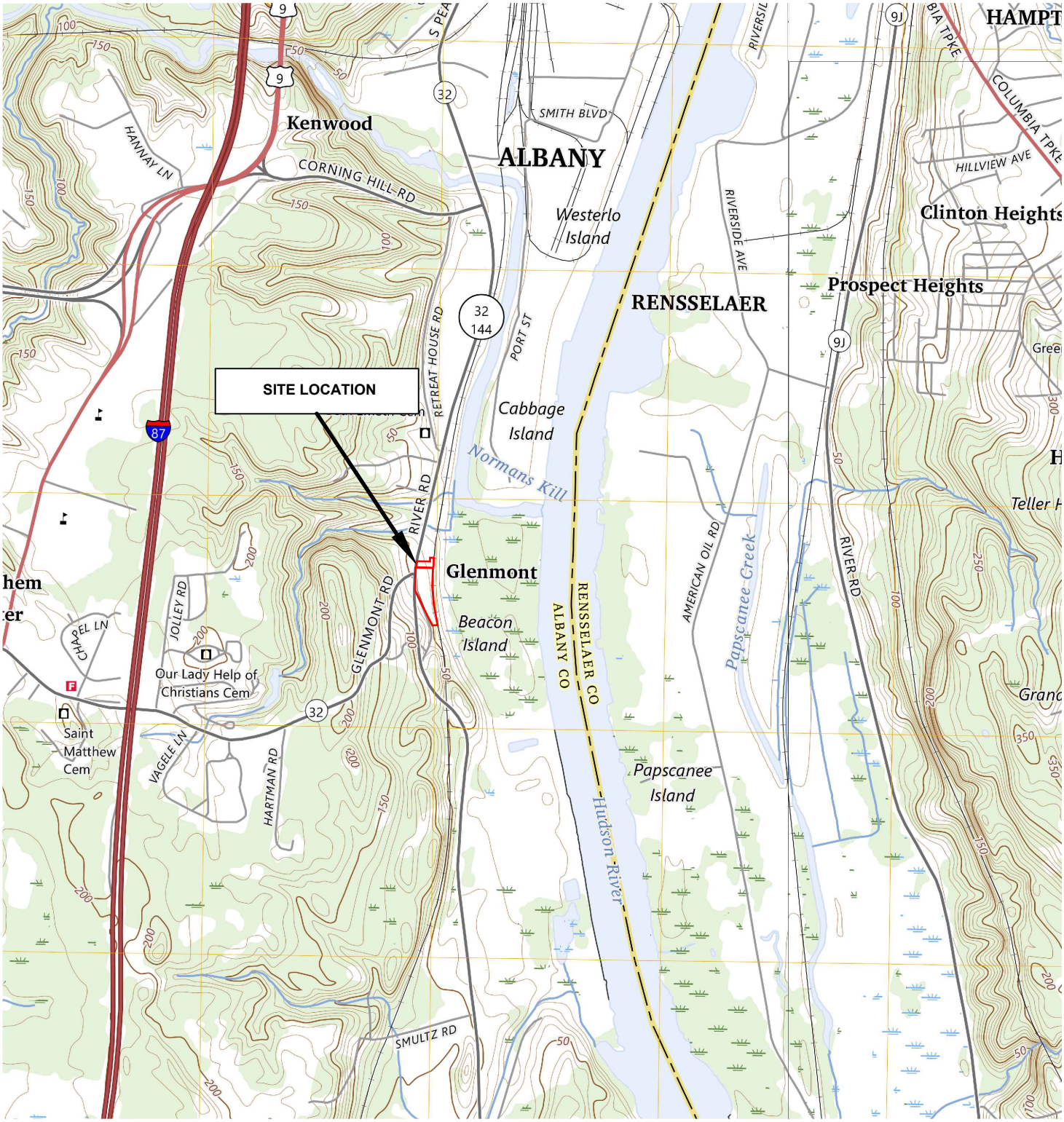
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NYSDEC and AECOM, 2019. Standby Contract No. D009803 between the State of New York Department of Environmental Conservation and AECOM for Engineering Services. October.

USEPA, 2016. *Green Remediation Best Management Practices: Site Investigation and Environmental Monitoring.* Office of Land and Emergency Management EPA 542-F-16-002. September.

Figures



0 2000 4000

APPROXIMATE SCALE IN FEET
SCALE= 1:24000



BASEMAP SOURCES:

USGS 7.5-minute Series Topographic Map 2023
Albany, NY Quadrangle, Albany Co. New York
Delmar, NY Quadrangle, Albany Co. New York
East Greenbush, NY Quadrangle, Rensselaer Co. New York
Troy South, NY Quadrangle, Rensselaer Co. New York

Title:	SITE LOCATION MAP
Location:	6 OLD RIVER ROAD GLENMONT NEW YORK 12077 SITE ID: 401088
Client:	NYSDEC

AECOM

Drafter: CLS	Date: October 2025
Drg. Size: 8.5 x 11	Job No.: 60770465

FIGURE 1

D:\6 Old River Road, Glenmont, NY\Figure 1\Figure 1 Site Location Glenmont October 2025.dwg User: carrie.szczepanski Oct 09, 2025 - 12:30pm



LEGEND

- DRINKING WATER WELL LOCATION (APPROXIMATE)
- PROPOSED BORING/MONITORING WELL LOCATION (APPROXIMATE)
- SEPTIC TANK AND LEACH FIELD (APPROXIMATE) LOCATION
- ST — STORMWATER SYSTEM

BASEMAP SOURCES:
ORTHOIMAGERY ACCESSED FROM GIS.NY.GOV ORTHOIMAGERY CLEARINGHOUSE. ORTHOIMAGERY DATED 2024.

0 50' 100'

1" = 80'

6 OLD RIVER ROAD NYSDEC SITE ID: 401088
6 OLD RIVER ROAD
Glenmont, New York
Project No.: 60770465 Date: 2025-12-16

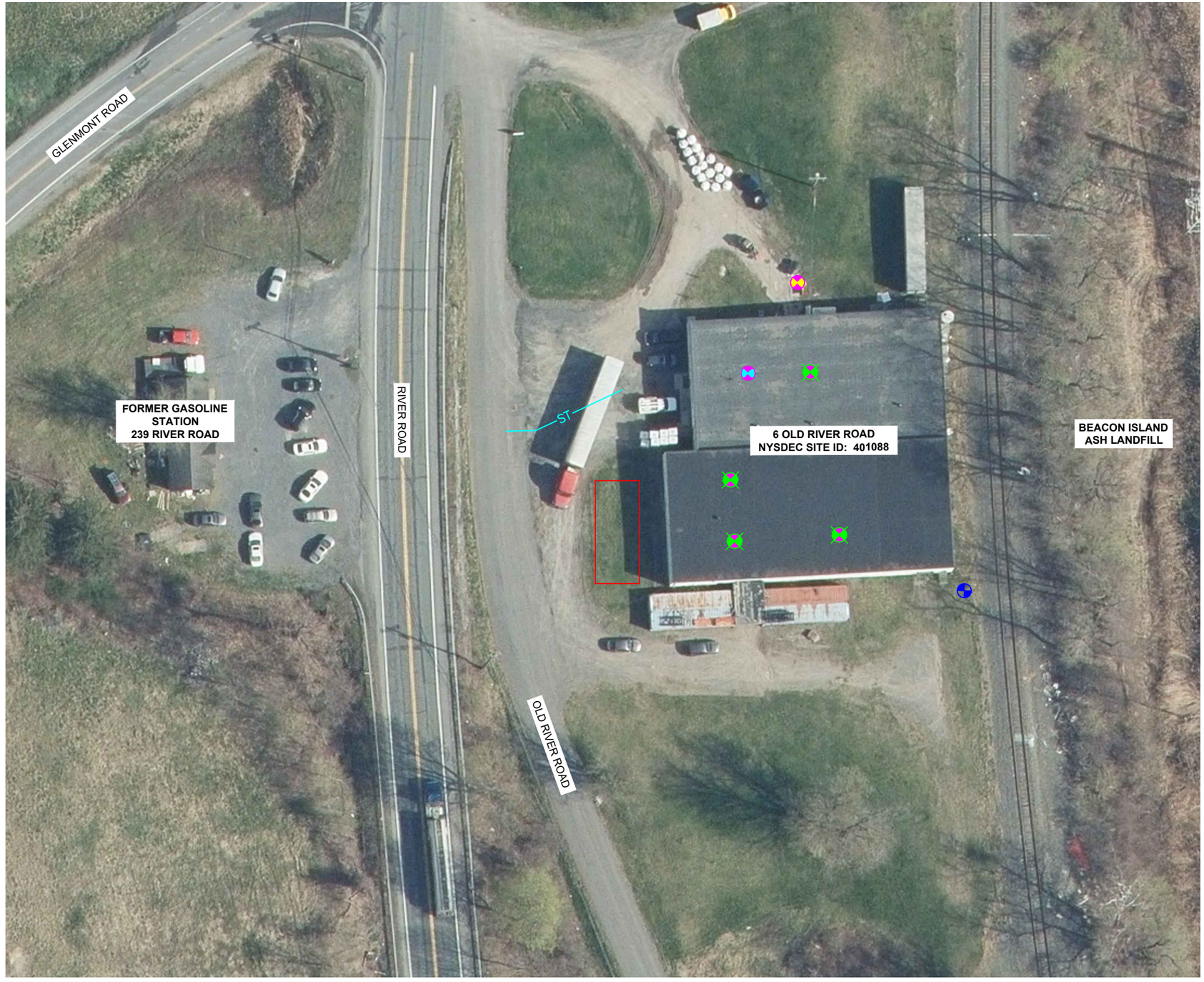
PROPOSED BORING AND MONITORING WELL LOCATION PLAN

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Figure: 2

Last saved by: CARRIE.SZCZEPANSKI(2025-12-16) Last Plotted: 2025-12-16
Filename: D:\6 OLD RIVER ROAD, GLENMONT, NY\FIGURE 3\WORKING-DWG_DEC_2025.DWG

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



LEGEND

- DRINKING WATER WELL LOCATION (APPROXIMATE)
- PROPOSED SOIL VAPOR SAMPLE AND CO-LOCATED AMBIENT AIR SAMPLE LOCATION
- INDOOR AMBIENT AIR SAMPLE OFFICE ABOVE CRAWL SPACE (APPROXIMATE)
- OUTDOOR AMBIENT AIR SAMPLE BACKGROUND (APPROXIMATE)
- SEPTIC TANK AND LEACH FIELD (APPROXIMATE) LOCATION
- ST — STORMWATER SYSTEM

BASEMAP SOURCES:
ORTHOIMAGERY ACCESSED FROM GIS.NY.GOV ORTHOIMAGERY CLEARINGHOUSE. ORTHOIMAGERY DATED 2024.

0 50' 100'

1" = 80'

6 OLD RIVER ROAD NYSDEC SITE ID: 401088
6 OLD RIVER ROAD
Glenmont, New York
Project No.: 60770465 Date: 2025-12-16

PROPOSED VAPOR AND AIR SAMPLING LOCATION PLAN

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Figure: 3

Table

Table 1
Sample Analytical Program
Site Characterization Work Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

Analytical Methods	Samples	Quality Control Samples						Total Number of Samples
		Field Duplicate	Matrix Spike	Matrix Spike Duplicate	Equipment/ Rinse Blank	Field Blank	Trip Blank	
Soil Samples								
VOCs via 8260D	4	1	1	1	1	0	1	9
SVOCs (including 1,4-Dioxane) via 8270	4	1	1	1	1	0	0	8
Herbicides via 8151A	4	1	1	1	1	0	0	8
Pesticides via 8081B	4	1	1	1	1	0	0	8
PCBs via 8082A	4	1	1	1	1	0	0	8
TAL Metals via 6010C	4	1	1	1	1	0	0	8
Cyanide via 9010	4	1	1	1	1	0	0	8
Mercury via 7470A	4	1	1	1	1	0	0	8
PFAS via 1633A	4	1	1	1	1	0	0	8
Groundwater Samples (2 Rounds of Sampling)								
VOCs via 8260D	10	2	2	2	0	0	2	18
SVOCs (including 1,4-Dioxane) via 8270	5	1	1	1	0	0	0	8
Herbicides via 8151A	5	1	1	1	0	0	0	8
Pesticides via 8081B	5	1	1	1	0	0	0	8
PCBs via 8082A	5	1	1	1	0	0	0	8
TAL Metals via 6010C	5	1	1	1	0	0	0	8
Cyanide via 9010	5	1	1	1	0	0	0	8
Mercury via 7470A	5	1	1	1	0	0	0	8
PFAS via 1633A	5	1	1	1	0	0	0	8
Air Samples								
TO-15	10	1	0	0	0	0	0	11
Waste Characterization (IDW)								
Full TCLP	2	0	0	0	0	0	0	2
Ignitability	2	0	0	0	0	0	0	2
Corrosivity	2	0	0	0	0	0	0	2
Reactivity	2	0	0	0	0	0	0	2

Appendix A (of the SCWP) – HASP

Universal Health & Safety Plan

6 Old River Road

6 Old River Rd
Glenmont, NY 12077
U.S.A.

Prepared For:

Client Name:	New York State Department of Environmental Conservation
Client Address:	625 Broadway, Albany, NY 12233
Project #:	60770465

Prepared By:

AECOM
40 British American Blvd
Latham, NY 12110

Preparer:

Name: Ray Heller
Title: Environmental Engineer I
Date Prepared: October 15, 2025

Signature

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

Name: Caroline Lee, CSP
Title: SH&E Manager, AME ENV U.S. East
Date Reviewed: December 9, 2025

Signature

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

Name: Abdiel Lopez Torres
Title: Project Manager V
Date Approved: February 5, 2026

Signature

Expiration:	**February 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 B: Applicable AECOM SHE Procedures
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**	Albany Med EmUrgentCare 329 Glenmont Road, Glenmont, NY 12077	9AM-8PM	(518) 264-9000
	Hospital	Albany Medical Center 43 New Scotland Ave, Albany, NY 12208	24 Hours	(518) 262-3125
	First Aid Providers	Abdiel Lopez Torres		(518) 951-2393
		Chris French		(518) 951-2204
	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:	Robert Doyle	518-357-2393
		Area/Business Line SH&E Manager:	Caroline Lee (Env East)	445-345-3568
		Regional SH&E Director:	Tony Indorato	757-298-1563

List ALL Short-Service Employees (<6 Months with AECOM or in Current Area/Job Description):			
SSE's Name	**SSE's Phone Number**	**Mentor's Name**	**Mentor's Phone #**

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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		February 5, 2026

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Project Manager Name	Project Manager Signature	Date

☒ AECOM is responsible for the safety of AECOM employees only unless specified in the contract. At no time is AECOM responsible for managing or directing subcontractor/subconsultant safety unless otherwise specified by contract language and agreed to by AECOM..

☐ 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.

☐ 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.

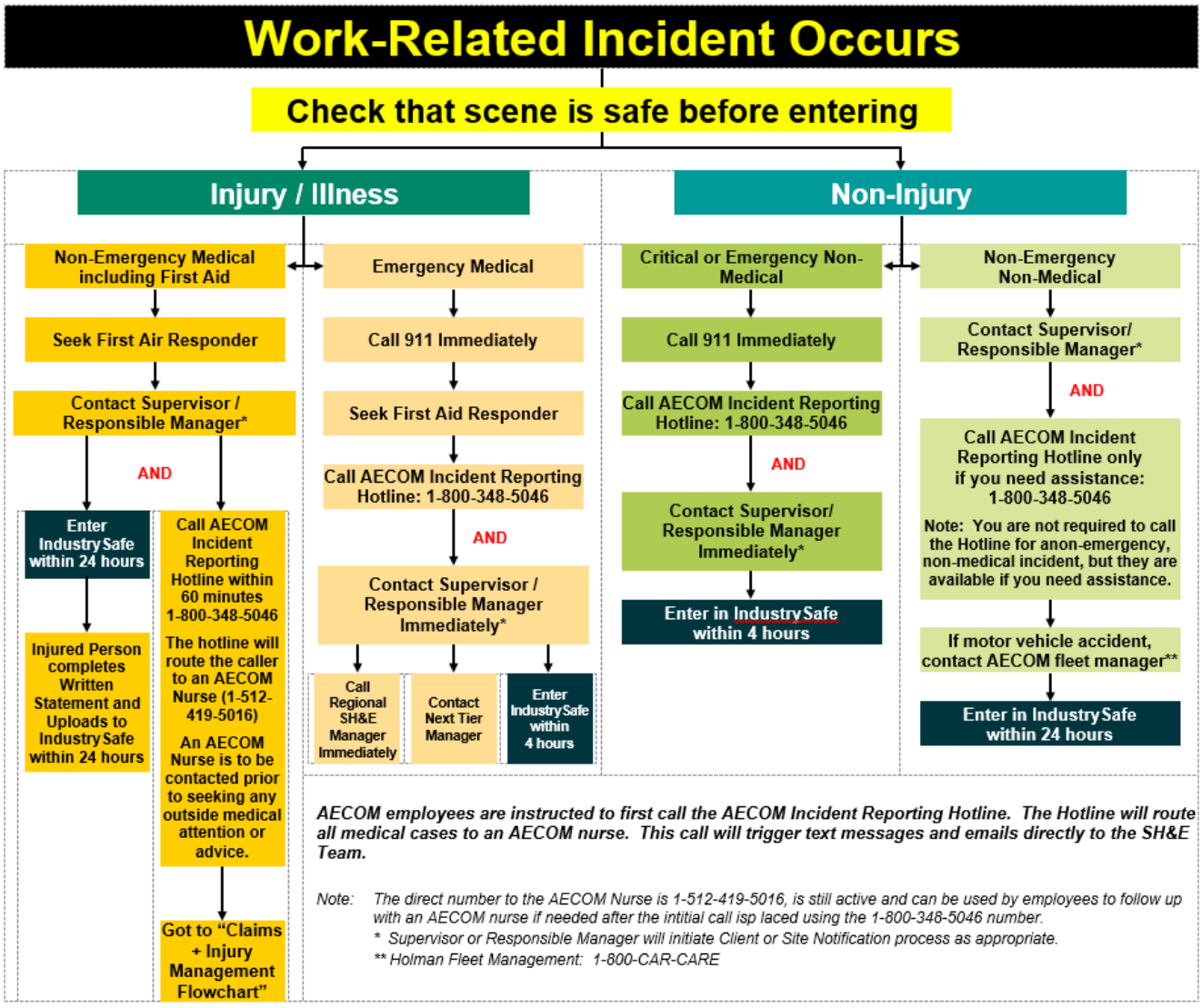
All Other Incidents:

- 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

Albany Medical Center **(518) 262-3125**

Address:	43 New Scotland Ave, Albany, NY 12208		
Hours of Operation:	24 Hours		
Travel Time:	14 Minutes	**Travel Distance:**	4.5 Miles

DRIVING DIRECTIONS TO HOSPITAL

From: 6 Old River Road
Bethlehem, NY 12077
New Start Address

To: 43 New Scotland Ave
Albany, NY 12208

1. Head **north** on **Old River Rd** toward **NY-144 N**	180 ft
2. Turn **right** onto **NY-144 N**	1.0 mi
3. Turn **left** onto **NY-32 S**	0.6 mi
4. Turn **right** onto **US-9W N**	1.7 mi
5. Turn **right** after the gas station (on the right)	344 ft
6. Turn **left** onto **Whitehall Rd**	79 ft
7. Turn **right** onto **Ten Eyck Ave**	0.3 mi
8. Turn **right** onto **Marwill St**	348 ft
9. Continue onto **Academy Rd**	0.6 mi
10. Turn **right** onto **New Scotland Ave**	0.1 mi
11. Slight **left** onto **S Lake Ave**	0.3 mi
12. Turn **right** onto **Myrtle Ave**	0.2 mi
13. Turn **right**	135 ft
Destination will be on the right	
Estimated driving time: 14 minutes	5.1 mi

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ROUTE MAP TO HOSPITAL

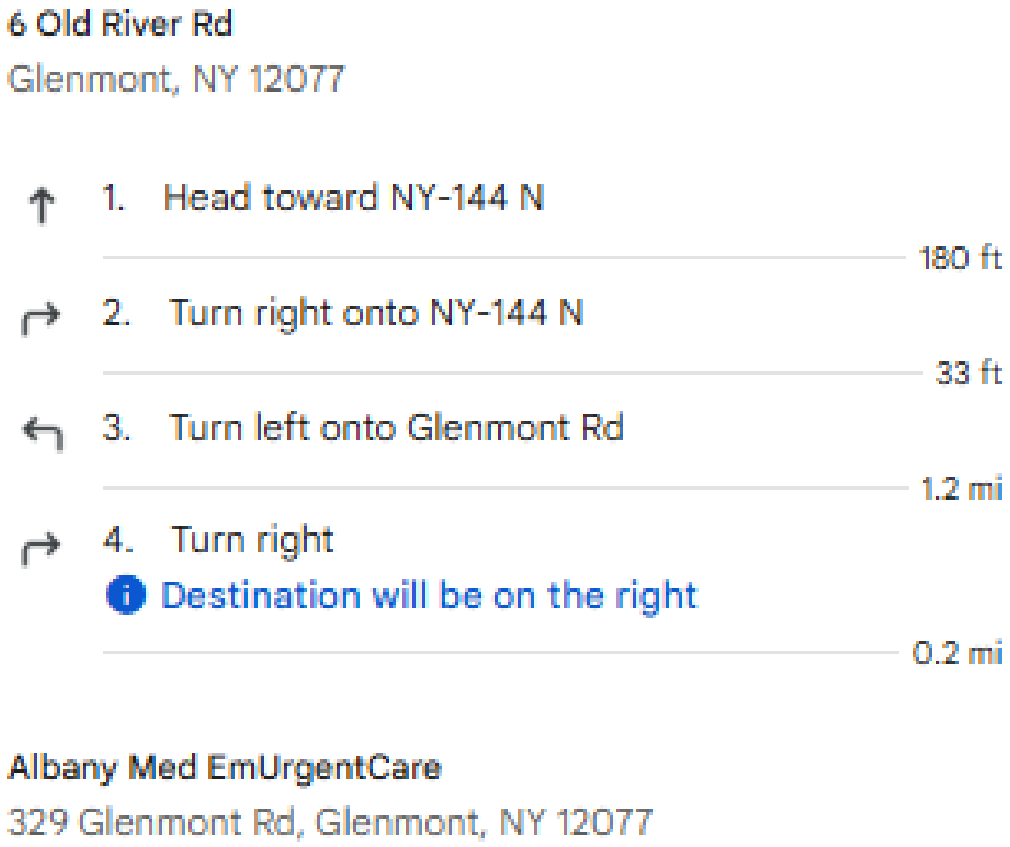


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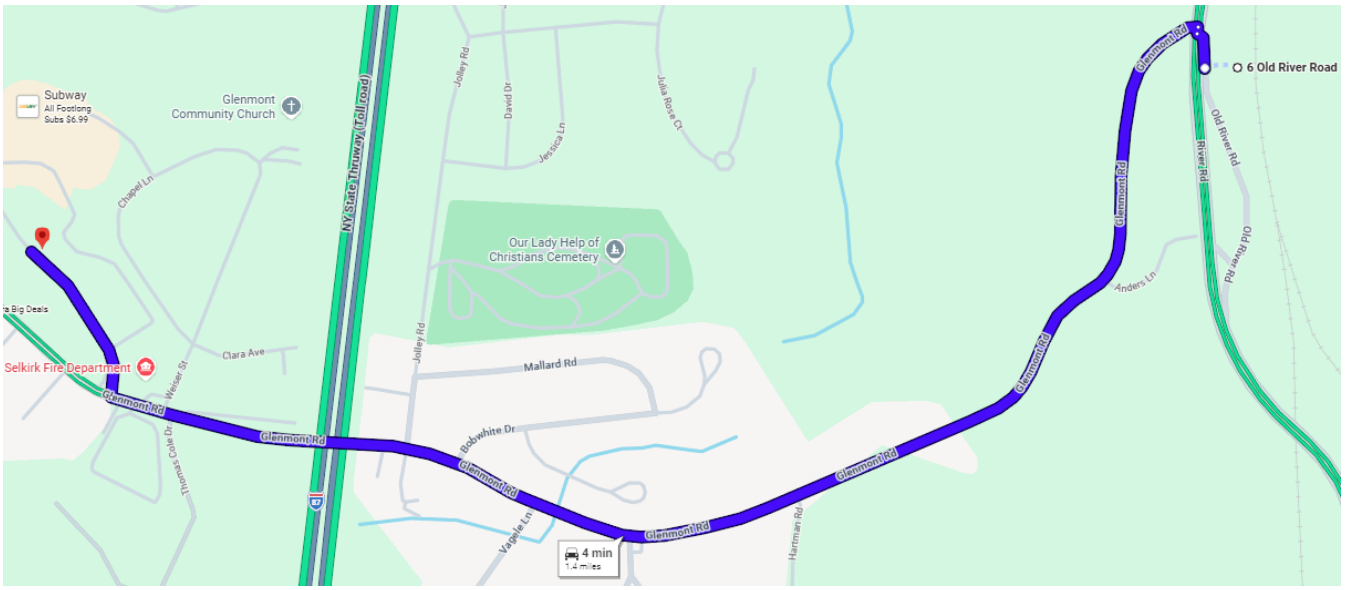
NEAREST OCCUPATIONAL CLINIC

Albany Med EmUrgentCare			**(518) 264-9000**
Address:	329 Glenmont Road, Glenmont, NY 12077		
Hours of Operation:	9:00AM to 8:00PM		
Travel Time:	4 Minutes	**Travel Distance:**	1.4 Miles

DRIVING DIRECTIONS TO OCCUPATIONAL CLINIC



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)

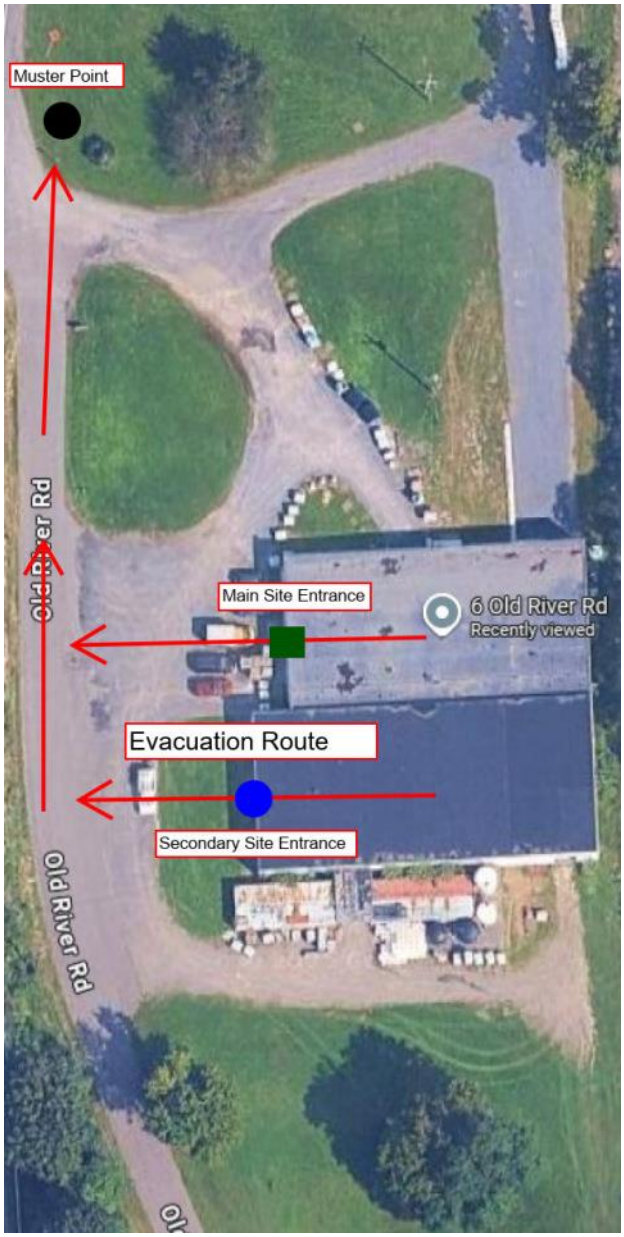


Table 4-3: Site Emergency Equipment and Its Location

ITEM(S)	ITEM DESCRIPTION	LOCATION(S)
First Aid Kit(s)	■ ANSI Z308.1 Class A, Type III; Qty=1	■ AECOM Field Vehicle

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Table 4-3: Site Emergency Equipment and Its Location

ITEM(S)	ITEM DESCRIPTION	LOCATION(S)
Automated External Defibrillator(s) (AEDs)	■ Standard AED	■ N/A
Fire Extinguisher(s)	■ 2A:10: B:C (5 lb. ABC) ■ 4A:80B:C (10 lb. ABC)	■ AECOM Fleet Vehicle(s) ■ Drill Rig/Geoprobe
Spill Kit(s)	■ Universal Absorbents/Pads	■ Drill Rig/Geoprobe
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.
    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:

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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.

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

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(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
- 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.

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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, 6 Old River Road , is located at 6 Old River Rd, Glenmont, NY 12077. The Site (#401088) is a 2.7-acre parcel (Tax Parcel ID: 98.01-3-18) used for light industrial and commercial operations. 6 Old River Road contains an active commercial fertilizer and road de-icing products processing facility in an onsite building. Several aboveground storage tanks are present, as well as many stacked liquid storage totes. The Site is located between Old River Road and CSX railroad tracks. Several small mounds of imported fill consisting of soil with small amounts of asphalt and C&D debris are located in the wooded area in the southern part of the Property. Easterly beyond the railroad tracks lies the NYSDEC State Superfund Site Beacon Island fly ash landfill (Site #C314117) and the Hudson River further to the east. Westerly beyond Old River Road is a used car dealer property on River Road. Several residential properties are located northerly and southerly from the Site at a distance, buffered by greenspace. 6 Old River Road and the surrounding areas are zoned Rural Light Industrial. Overburden deposits at the Site are anticipated to be alluvial deposits and glacial till composed of fine sands, silts and clay at undetermined depths beyond 20 feet below ground surface (bgs). Beneath the till, bedrock geology is anticipated to be from the Helderberg and Austin Glen Formation.

5.1 Site Background/History

6 Old River Road was first used as a ceramic kitchen tile showroom, and then transitioned into a motorcycle products wholesaler and distributor. No exact dates on the transitions from one business to another are known; however, the current owner has owned the property for approximately 40 years. Currently, the Site contains an active commercial fertilizer and road de-icing products processing facility in an onsite building. Several aboveground storage tanks are present, as well as many stacked liquid storage totes.

Historic city directory records revealed a former gasoline station at 239 River Road, was located adjacent to the west and directly upgradient of the subject Property from the early 1950s to the late 1970s, prior to environmental regulations. No records of underground storage tank installation or removal, and no records of site investigations of potential historic petroleum spills were found for the Site.

Based on preliminary information from a Limited Environmental Site Assessment (ESA) Report (connected to Spill #2401808) and initial neighborhood site observations, it was found that an onsite private water supply well contained low levels of chlorinated volatile organic compounds (CVOCs), namely, cis-1,2-dichloroethene (DCE), trichloroethene (TCE), vinyl chloride (VC) and 1,2-dichloroethane (DCA). The ESA was found to be inconclusive by the Division of Environmental Remediation with respect to potential source areas and potential Soil Vapor Intrusion impacts. Additional, and potentially more accurate, information will become available during the planned Site Characterization.

5.2 Client and/or Third-Party Operations at Site

A commercial fertilizer and road de-icing products processing facility is currently operating at the property.

5.3 Scope of Work

The objective of this work assignment is to complete a site characterization for 6 Old River Road, Site No. 401088. The Site Characterization will assess the lateral and vertical extents of soil and groundwater contamination within overburden soils down 25 feet below ground surface (bgs) or to the top of bedrock (if encountered); re-evaluate the surface and subsurface characteristics of the Site, including topography, stratigraphy, hydrogeology, and depth to groundwater; and identify the source(s) of contamination in environmental media within overburden soils, assess and evaluate the potential migration pathways, and identify actual or potential receptors of contaminants. The scope of work will include a geophysical survey and a land survey, followed by surface soil sampling, installation of groundwater wells via hollow-stem auger (HSA) methods with subsequent groundwater and soil sampling, sampling of the onsite private water supply well, subsurface soil sampling, and soil

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gas sampling. Environmental sampling will be managed by a laboratory call out contract. The field work includes the following elements:

- AECOM will conduct soil vapor intrusion sampling using Summa® canisters to collect five indoor air samples and four sub-slab vapor samples from the building; one field duplicate sample will be collected. One outdoor air sample will be collected. All indoor air, sub-slab, and outdoor air samples will be collected with a 24-hour sampling period.
- Prior to intrusive work, geophysical screening will be conducted by GPRS, Inc. to identify the presence of underground utilities or any anomalies within the work areas where drilling will be conducted. This will be done using geophysical methods. Prior to mobilization, the drilling subcontractor, Nothnagle Drilling, shall have the required utility clearance mark-outs necessary for commencing drilling activities at the site. In addition, at each proposed soil boring location, the drilling subcontractor will hand clear/soft dig with a bucket auger down to 5-feet below ground surface.
- Soil borings will be advanced and sampled at up to four locations at the Site, using hollow stem auger drilling and split spoon sampling techniques. Soil sampling will be conducted continuously to classify subsurface material. All soil samples will be visually described and classified, inspected for signs of contamination, and screened with a photoionization detector (PID) for the presence of organic vapors by a qualified geologist. One soil sample from each soil boring will be collected and submitted for analysis of TCL/TAL VOCs, SVOCs, Metals, Pesticides/Herbicides, PCBs, PFAS, and 1,4-Dioxane. Community air monitoring will be performed at select locations.
- Four overburden monitoring wells will be installed at soil boring locations. All monitoring wells, and soil borings (if not converted to a well) will be surveyed for horizontal and vertical control. Each monitoring well will be constructed with 10 feet of 2-inch inner diameter (ID) #10 slot polyvinyl chloride (PVC) screen attached to a 2-inch ID, Schedule 40 PVC to the approximate ground surface and a 1-foot Schedule 40 PVC sump at the bottom. Wells will be screened at a depth that straddles the water table (or above the bedrock interface, if bedrock is encountered below the water table). A #2 size sand pack will be installed from the bottom of the well screen up to 2 feet above the top of each of the well screens. Then, a minimum 2-feet thick bentonite seal will be installed above the sand pack, hydrated and allowed to sit for 30 minutes prior to the placement of the cement/bentonite grout. The grout will be placed from above the bentonite seal to an elevation of 1-foot below grade via a tremie pipe. Each monitoring well shall be finished with a flush mount curb box with locking covers.
- All monitoring wells to be sampled will be developed following the procedures in the Field Activities Plan (FAP). Monitoring well development will be discontinued when the turbidity of the discharged water is below 50 NTU and the other indicator parameters have stabilized, the well has been purged to dryness, or five well volumes have been removed.
- A comprehensive round of water levels will be measured from the four new overburden monitoring wells and the onsite water supply well. If present, NAPL thickness will be measured.
- Groundwater samples collected from newly installed overburden monitoring wells, and the onsite water supply well will be collected using low-flow sampling procedures and will be analyzed for TCL/TAL VOCs, SVOCs, Metals, Pesticides/Herbicides, PCBs, PFAS, and 1,4-Dioxane. Monitoring well purging will be discontinued when the water quality parameters have stabilized, the well has been purged to dryness, or three well volumes have been removed.
- AECOM's site survey subcontractor, KHEOPS Architecture, Engineering and Survey, DPC, will create a survey of the data collected at the Site. This will include new monitoring well and soil boring locations and elevations, soil vapor sampling locations, ground surface, outer casing, and inner pipe elevations as well as other relevant Site features.
- All soil cuttings, rock cores, decontamination fluids, development and purge water, plastic tubing, and personal protective equipment (PPE) will be contained in DOT approved investigation-derived waste (IDW) 55-gallon drums. One soil and one aqueous sample from IDW will be collected and submitted for laboratory analysis of waste characterization parameters. All IDW drums will be staged in an accessible on-site storage area designated by AECOM. Following completion of monitoring well installation and sampling, IDW will be transported off-Site under manifest by Momentum Environmental Services LLC, for proper disposal.

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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
Driving To and From the Site	☐ Yes	☒ No	☒	☒	☐
Load and Unload Vehicle	☐ Yes	☒ No	☒	☒	☐
Drilling, Grouting, Monitoring Wells	☐ Yes	☒ No	☐	☒	☐
Environmental Soil Sampling with Hand Auger	☐ Yes	☒ No	☐	☒	☐
Gauging Groundwater Monitoring Wells	☐ Yes	☒ No	☒	☐	☐
Groundwater Sampling – Low Flow	☐ Yes	☒ No	☒	☐	☐
Hand and Power Tools	☐ Yes	☒ No	☒	☒	☐
Helium Trace Test	☐ Yes	☒ No	☐	☒	☐
Hollow Stem Auger Drilling Oversight	☐ Yes	☒ No	☐	☒	☐
IDW Management	☐ Yes	☒ No	☐	☒	☐
Land Survey (At Grade)	☐ Yes	☒ No	☐	☒	☐
Monitoring Well Construction	☐ Yes	☒ No	☐	☒	☐
Oversight of Utility Clearance	☐ Yes	☒ No	☐	☒	☐
Portable Generator Operation	☐ Yes	☒ No	☒	☒	☐
Residential Entry/Work	☐ Yes	☒ No	☒	☒	☐
Site Walk – Construction/Demolition Site	☐ Yes	☒ No	☒	☒	☐
Sonic Drilling	☐ Yes	☒ No	☐	☒	☐
Summa Canister Sampling	☐ Yes	☒ No	☒	☐	☐

5.4 Key Dates

Project Start Date:	TBD: Winter 2026
Field Work Start Date:	TBD: Winter 2026
Project Completion Date:	TBD

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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
☒ **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
☒ **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
☒ **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 Alone**	HH	S3AM-314-PR1	Lone Worker Management Plan (Section 9.5)

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.

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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
☒	**Geophysical Survey Services**	■ Chris French
☒	**Hearing Protection**	■ Caroline Lee
☒	**Heavy Equipment**	■ Chris French

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 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)
Other Common Site COCs					
1,2-Dichloroethane (1,2-DCA)	☐ Soil ☒ Groundwater ☐ Vapor ☐ N/A	Inhalation	50 ppm	50 ppm	11.05
Cis-1,2-Dichloroethylene (Cis-1,2-DCE)	☐ Soil ☒ Groundwater ☐ Vapor ☐ N/A	Inhalation	200 ppm	200 ppm	9.65
Trichloroethylene (TCE)	☐ Soil ☒ Groundwater ☐ Vapor ☐ N/A	Inhalation	0.2 ppm	10 ppm	9.45
Vinyl Chloride	☐ Soil ☒ Groundwater ☐ Vapor ☐ N/A	Inhalation	1 ppm	1 ppm	9.99

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).

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Table 5-5: Decontamination Procedures & Equipment

Procedure	Equipment Needed
Remove all equipment, sample containers, and notes to the CRZ. Obtain decontamination solutions and decontaminate the tools (shovels, auger flights, etc.) by brushing them under a water rinse. A high-pressure steam cleaner also may be used for decontamination. All waste and spent decontamination solutions will be properly contained.	Alconox solution, deionized water, brushes
Remove disposable booties, or scrub boots with a stiff bristle brush and water, when necessary. Wash tubs and chairs will be provided.	Deionized water and brushes
Remove outer chemical resistant gloves (and boot covers, if used).	
Remove Tyvek coverall; discard in provided container.	
Remove hardhat and eye protection.	
Remove respirator.	
Remove inner gloves.	
Wash hands and face.	Deionized water
The decontamination area will be covered with plastic sheeting that will be replaced when torn or heavily soiled and at the end of each shift.	Plastic sheeting

Table 5-6: Equipment Decontamination Procedures

Type Equipment	Decontamination Solution	Procedure
Respirator	Alconox Solution and deionized water	**Washing**: Disassemble and wash with an Alconox solution in deionized water. A stiff bristle (not wire) brush may be used. **Rinsing**: Rinse in deionized water to remove all traces of detergent. This is important to prevent dermatitis. **Disinfecting**: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. **Final Rinsing**: Rinse thoroughly in clean water to remove all traces of disinfectant. **Drying**: Drain and dry by hanging by the straps from racks or by towel drying with clean, soft cloths or paper towels.
Water quality meter, oil/water interface probe, down-hole water sampling pumps, reusable sampling tools/ equipment	Alconox Solution and deionized water	**Washing**: Disassemble and wash with an Alconox solution in deionized water. **Rinsing**: Rinse in deionized water to remove all traces of detergent.
Drilling Equipment/ Tools	High-pressure steam cleaner	Apply steam cleaner to used equipment/ tools

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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 ■ TSI Dustrak	■ 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

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Table 6-2: Monitoring Procedures and Action Levels

	Parameter	Zone Location and Monitoring Interval	Action Level	Response Activity
				Manager approval. Don Level C PPE (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.
☒	**VOCs and Volatile Hydrocarbons** (total by PID)	Edge of Exclusion Zone. See guidance in NYSDOH's Generic Community Air Monitoring Plan (**Attachment E**).	■ See guidance in NYSDOH's Generic Community Air Monitoring Plan (**Attachment E**).	
☐	**Benzene** (by PID with benzene-specific separation tube)	Breathing zone, continuously where indicated by VOC readings	> 0.25 ppm	■ Cease work, exit the area, 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. See guidance in NYSDOH's Generic Community Air Monitoring Plan (**Attachment E**).	■ See guidance in NYSDOH's Generic Community Air Monitoring Plan (**Attachment E**).	

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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:	**Momentum Environmental Services, LLC**

Scope of Work: IDW Management

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Load drums for transport ■ Unload drums at disposal facility	■ No	TBD

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:	**Nothnagle Drilling**

Scope of Work: Drilling Services

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Advance test borings ■ Install monitoring wells ■ Abandon monitoring wells	■ Yes	Chris French

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 3:	**GPRS Inc.**

Scope of Work: Geophysical Survey

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Subsurface Utility Clearance ■ Mark-out of identified utilities & anomalies	■ No	Chris French

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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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
☒	**Respiratory Protection & Fit Test**	Employees needing to wear respirators
☒	**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**	N/A
☒ **Locks**	Lock up monitoring wells to prevent access by the public.
☐ **Barricades**	N/A
☒ **Cones**	Traffic cones will be utilized when performing site activities in driveway areas.

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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)	
Commercial fertilizer and road de-icing products processing facility	Bareground Systems (Tenant)	Susan Walter (Site Owner)	518-368-5096	☐ Yes	☒ No
				☐ Yes	☐ No
				☐ Yes	☐ No

Table 9-4: Simultaneous Operations on Neighboring Sites

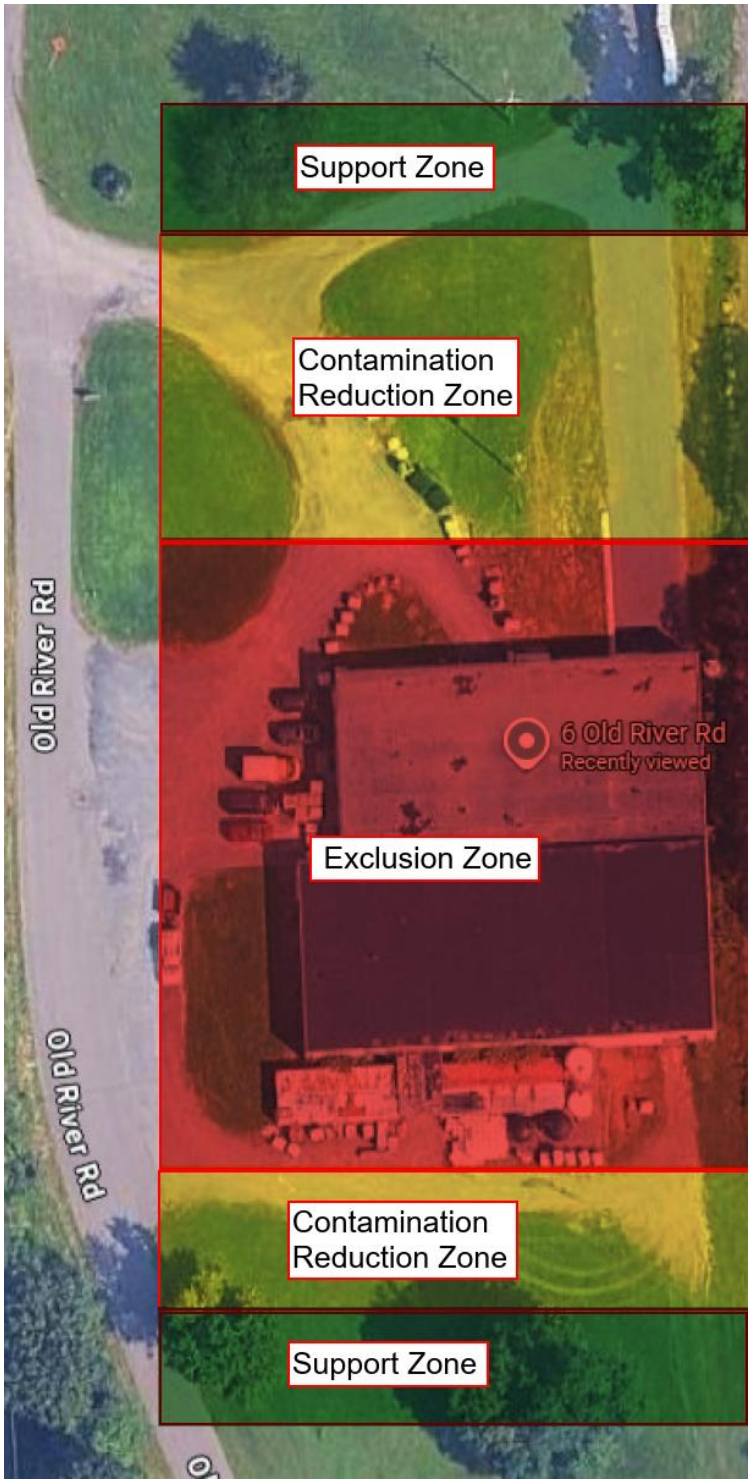
☒ Yes, see table below for details ☐ None, not applicable

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)	
Used car dealer	T3 Auto Center	N/A	N/A	☐ Yes	☒ No
Beacon Island fly ash landfill	NYSDEC	N/A	N/A	☐ Yes	☒ No
				☐ Yes	☐ No

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9.3 Site Control Maps/Diagrams

Work Area Layout



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.**

9.5 Lone Worker

AECOM discourages employees from working alone (i.e., where AECOM personnel are out of visual and audio range of others) when performing field tasks (see Working Alone SHE Procedure S3AM-314-PR1). If lone work is to be performed, a communications/check-in plan must be developed and implemented using the table below.

Table 9-5: Lone Worker Management Plan

Justification:	Field activities do not warrant the need for two people.
Lone Worker:	TBD
Check-In Requirement:	Check in and out with project manager by text or phone upon arrival and before leaving the site. If site activities are anticipated to be longer than 4 hours a halfway check in will be included..
Check-In Contact:	Project Manager – Abdiel Lopez Torres: (518) 951-2393
Hazard Summary:	Potential hazards include slip/trip/fall by tools of the job, vehicle hazards, injury by people, etc.
Response Plan:	If lone worker has not called during anticipated time, initiate contact. Call at least 3 times. If no answer, contact onsite client to perform wellness check. If client is not available, contact local police for wellness check.

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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
- ☐ **Connected Worksites** (i.e., connection between employees or project elements to be successful)
- ☐ **Drones**
- ☐ **Virtual Reality (VR) or Augmented Reality (AR)**
- ☐ **GPS** – Location devices: N/A
- ☐ **Radio Frequency Identification** (RFID)
- ☐ **Other:** N/A
- ☐ **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)

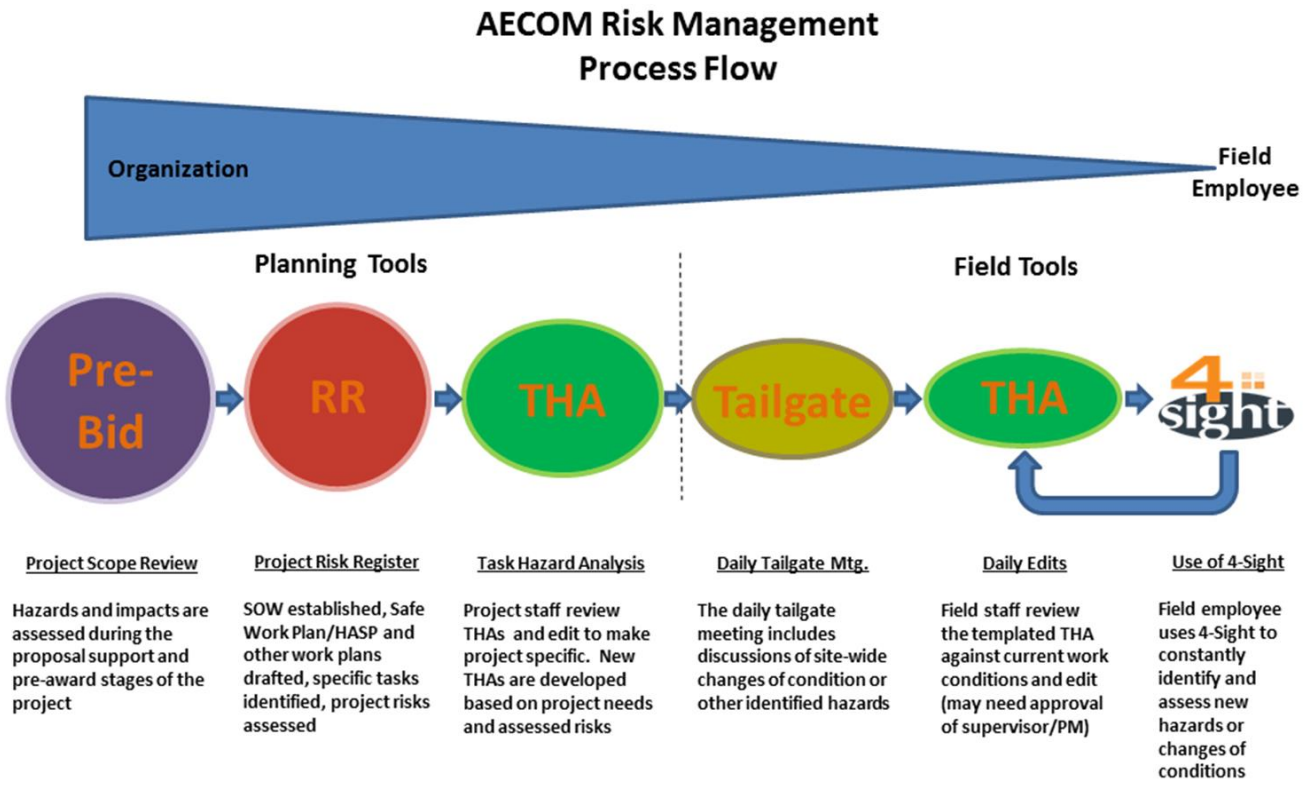
A competent person is an employee who, through education, training, and experience, has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and 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

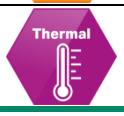
THAs should include consideration of the following hazard categories when identifying hazards and task specific controls:

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.

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.

Incidents, Near Misses, Audits/Inspections and Safety Observations

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 6 Old River Road 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

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Task Name:	DRILLING, GROUTING, MONITORING WELLS	**Control #:**	01-01-03-07

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 1b. Failure to have underground utilities identified could result in explosion, electrocution, injury, death, property damage.	5 **10**	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. 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 4
On-Site Edits:				
2. Setup Drill Rig and work zone	**2a**. Struck by vehicle or equipment traffic **2b**. Sprain or broken bones due to slip, trip or fall **2c**. Struck-by, crushed-by, caught-by drill rig.	8 6 **10**	**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. **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. **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 2 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.

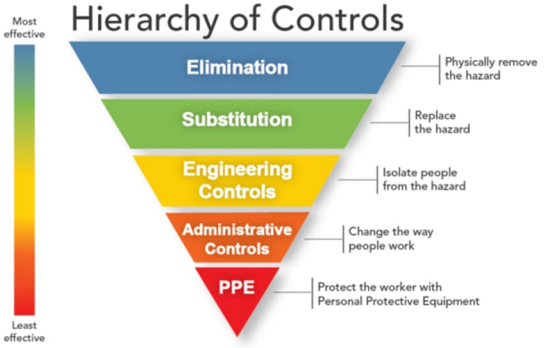
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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***
- ***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**
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Driving to and From Site**	**Control #:**	**01-01-12-02**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	**01-01-12-02**

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:				
4.	4a.		4a.	
On-Site Edits:				

Additional Notes:

Task Hazard Assessment

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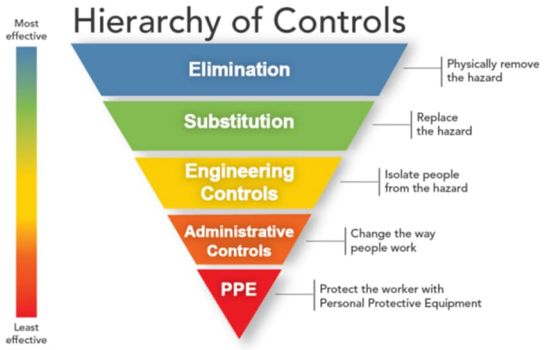
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Environmental Soil Sampling - Hand Auger**	**Control #:**	**01-01-24-02**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 is 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:	Environmental Soil Sampling - Hand Auger	**Control #:**	01-01-24-02

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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On-Site Edits:				
3. Collecting soil samples	3a. Contact with contaminated soil.	4	3a. Use clean sampler to touch soil. Wear nitrile gloves under 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 gloves 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 under cut resistant gloves. If nitrile glove 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:	**Environmental Soil Sampling - Hand Auger**	**Control #:**	**01-01-24-02**

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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On-Site Edits:					

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Environmental Soil Sampling - Hand Auger	Control #:	01-01-24-02

All Employees:

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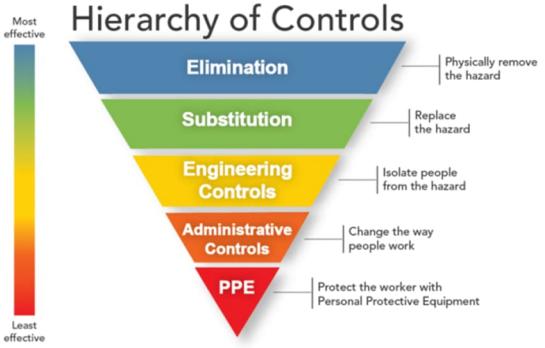
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Task Hazard Assessment

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Task Name:	Gauging Liquid Levels in Groundwater Monitoring Wells	**Control #:**	01-01-05-07

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	01-01-05-07

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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	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 #:**	01-01-05-07

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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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 #:	01-01-05-07

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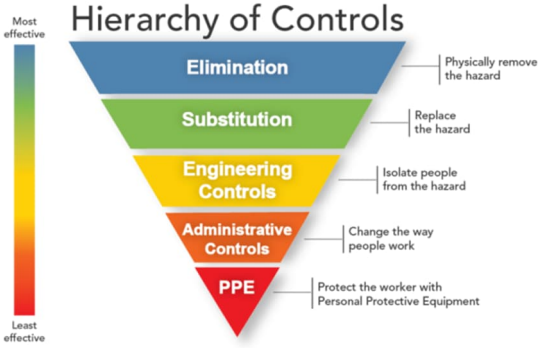
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Task Hazard Assessment

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Task Name:	**Groundwater Sampling – Low Flow**	**Control #:**	**01-01-05-12**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	**01-01-05-12**

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 #:**	**01-01-05-12**

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. 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:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Groundwater Sampling – Low Flow	Control #:	01-01-05-12

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

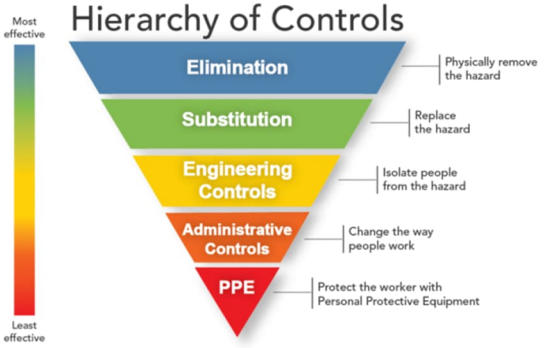
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- ***What can go wrong?***
- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

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***

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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:	**Hand and Power Tools**	**Control #:**	**01-01-08-01**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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, shovels, hand auger

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 #:**	**01-01-08-01**

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:				
2.	2a.		2a.	
On-Site Edits				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Hand and Power Tools	Control #:	01-01-08-01

All Employees:

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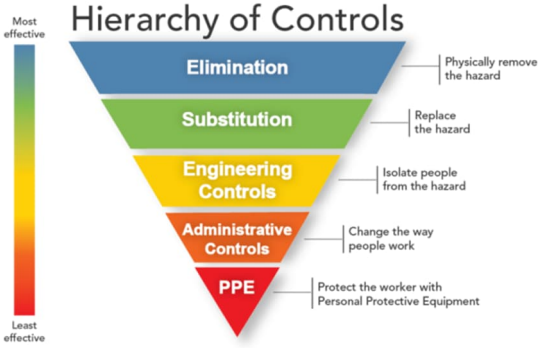
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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?***
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- ***What can be done to make it safer?***
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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:	**Helium Trace Test**	**Control #:**	**01-01-05-11**

Project Name:	6 Old River Road	Client:	NYSDEC	**Date:**	12/19/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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: Nitrile, Kevlar, Leather ☒ Hearing Protection If noise level above 85dbA ☐ Other:
Tools & Equipment:	Helium Detector Insect Repellant PID or multigas

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. Preparation. Use 2% Helium to calibrate Dielectric MGD 2000 or Ion Science Gas Detector	1a. Inhalation of Helium may cause headache, dizziness, labored breathing, unconsciousness	8	1a. Do not inhale or allow others to inhale helium	2
	1b. Gas contained in pressurized container, container punctured or explodes causing injury from shrapnel or helium gas in confining area	**8**	1b. Remove regulator when not in use, Secure cylinder, keep cylinder away from heat source, do not store in automobile or truck with windows closed on hot days,	2I
On-Site Edits:				
2. At well, Inspect and open well cap and cover	2a. Potential exposure to site contaminants, potential injury dependent upon contaminate concentration and type	8	2a. Measure environment with an LEL or PID prior to using helium detector to ensure area is safe. Wear identified PPE.	4
	2b. Cuts or crushing injury from pinch points at lids / caps.	8	2b. Wear leather gloves. Note any damage to lids, bolts or locks and record in field book	4
	2c. Insect bites from ants, spiders, ticks.	8	2c. Inspect well carefully, if sign of insects, allow to scatter.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Helium Trace Test**	**Control #:**	**01-01-05-11**

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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On-Site Edits:				
3. Collect helium readings	3a. Exposure to site contaminates, unknown vapors causing dermatitis or inhalation injury	8	3a. Use PID and Multigas meter to determine area atmosphere is free of contaminates and vapors. If contaminates are found above acceptable levels, stop work and contact the SSO.	4
	3b. Trip and fall injury	7	3b. Ensure sample collection tubing and sampling materials are placed behind cones, flags or caution tape to increase visibility reduce chance of tripping over same	4
	3c.Pinch Point injury to fingers when attaching tubing to collection port	5	3c Keep fingers clear of collection port area when attaching tubing. Wear nitrile gloves under leather protective gloves. ***Note:*** *If the sampling event calls for the use of Tedlar bags to collect vapor for analysis, refer to the instruction below:* • Connect vapor sampling assembly (inlet and outlet tubing, vacuum pump) to the vapor sampling collection port. • Withdraw vapor sample from vapor stream and collect in sample container. • Secure container by closing the sample intake valve. • Preserve gas sample in chilled cooler for transport to analytical lab for analysis. • Secure vapor sampling collection port (lock and seal).	2
On-Site Edits:				
4.	4a.		4a.	

Task Hazard Analysis

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Task Name:	**Helium Trace Test**	**Control #:**	**01-01-05-11**

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On-Site Edits:				
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On-Site Edits:				
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On-Site Edits:				
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On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Helium Trace Test	Control #:	01-01-05-11

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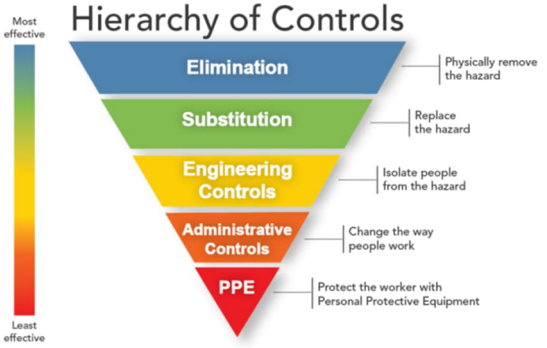
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Hollow Stem Auger Drilling Oversight**	**Control #:**	**01-01-03-05**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	**01-01-03-05**

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 #:**	**01-01-03-05**

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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 #:	01-01-03-05

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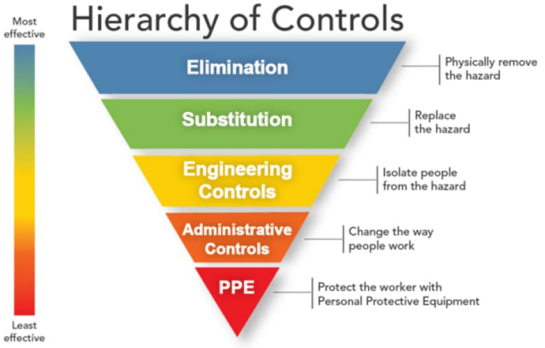
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Investigation Derived Waste Management**	**Control #:**	**01-01-14-02**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 (3mm)	☐ Hearing Protection	☒ Other: Tyvek as needed to protect skin and clothing
Tools & Equipment:	Socket set Respirator with GME-P100 cartridges	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:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Investigation Derived Waste Management**	**Control #:**	**01-01-14-02**

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. Remove drum lid	3a. Pinch points at drum ring	6	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)	4
	3b. Sharp edges on drum ring or rim	7	3b. Evaluate rim and ring for sharp edges, avoid handling as much as possible. Wear cut resistant gloves	4
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:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Investigation Derived Waste Management**	**Control #:**	**01-01-14-02**

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. 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:				
6. Moving/relocating drums	6a. Exertion 6b. Trips and Falls	**15** **6**	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. 6b. See 2a above	4 5
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Investigation Derived Waste Management	Control #:	01-01-14-02

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

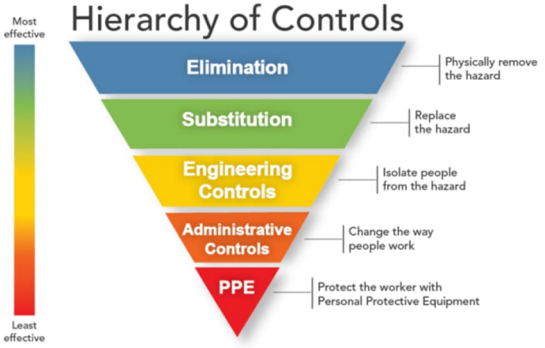
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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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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:	**Land Survey – At-Grade**	**Control #:**	**01-01-10-06**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 the work site. These include ticks, spiders, mosquitoes, poisonous or other noxious plants, 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.	3

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Land Survey – At-Grade**	**Control #:**	**01-01-10-06**

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 #:**	**01-01-10-06**

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)*
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:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Land Survey – At-Grade	Control #:	01-01-10-06

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

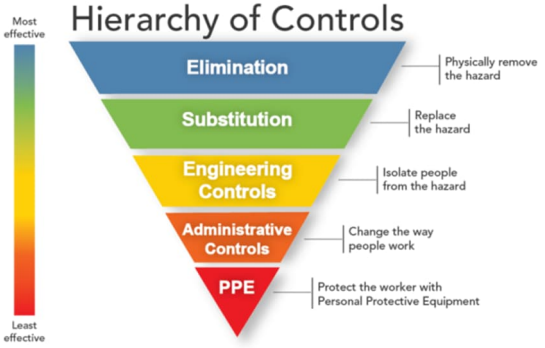
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- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
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Printed Name	**Signature**
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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:	Load and Unload Vehicle	**Control #:**	01-01-12-04

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	**01-01-12-04**

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:				
3.	3a.		3a.	
On-Site Edits				
4.	4a.		4a.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Load and Unload Vehicle	Control #:	01-01-12-04

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

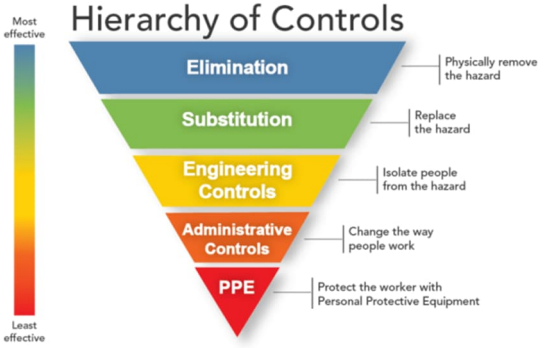
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	**01-01-05-05**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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; N95/dust mask; Half/full face respirator with OV-P100 cartridges

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

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	**01-01-05-05**

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. 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**		4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	**01-01-05-05**

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)*
	5c. Noise	6	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.	2
	5d. Back strain/ overexertion when unloading equipment	8	5c. Wear hearing protection while equipment is in use.	4
			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.	8	6a. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds.	4
	6b. Slip, trip, and fall (STF) hazards from uneven	8	6b. Check walking/movement path for STF obstructions. Conduct pre-site walk with crew prior to work and remove or isolate STF hazards.	4
	6c. Injury from improper tool use.	8	6c. Do not use tools for unintended purposes (such as a saw to open bags of bentonite instead of an approved cutting tool).	3
	6d. Dust inhalation.	6	6d. Wear a dust mask and minimize dust when pouring powdered bentonite, concrete, or cement.	2
	6e. Cutting PVC, cuts, lacerations	8	6e. Use PVC cutter for cutting PVC. Wear cut-resistant gloves (Level 2), keep fingers and other body parts away from cutting tool blade.	3
	6f. Exposure to airborne chemicals or explosive atmosphere	8	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 are above the action levels listed in the HASP.	4
	6g. Crushed by, pinch point on drill rig	**10**	6g. Keep body parts away from moving parts on drill rig.	4
On-Site Edits:				
7. Installation of sand filter pack/bentonite	7a. Injury form cutting bags open	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	4
	7b. Eye and respiratory injury due to dust and other airborne particles	6	7b. Refer to the SDS for use information. Wear long sleeved shirt, long pants, gloves, and safety glasses. Wear a N-95 dust respirator when dealing with quartz sand (moving bags, pouring, mixing, and putting bags in trash).	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Monitoring Well Construction**	**Control #:**	**01-01-05-05**

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)*
	7c. Back or muscle strain due to improper load or lifting techniques	8	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
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Construction	Control #:	01-01-05-05

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

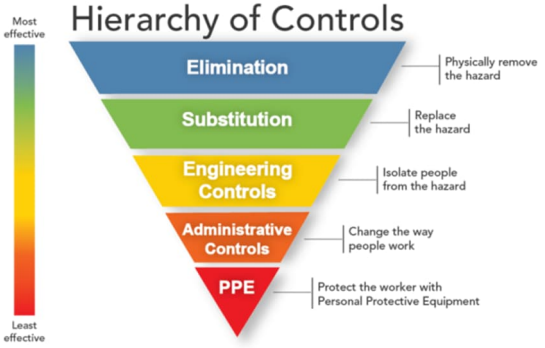
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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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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:	**Oversight of Utility Clearance**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):	None	**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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: Available ☐ 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:				
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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.

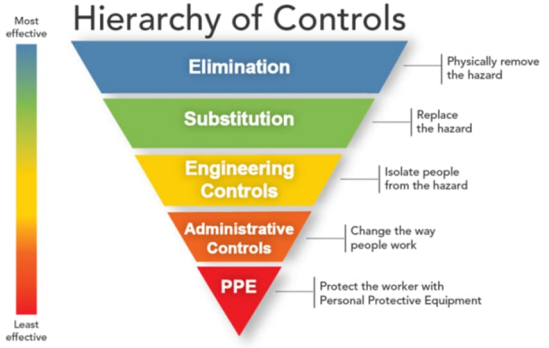
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- ***What can be done to make it safer?***
- ***What have I done to communicate the hazards?***

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***
- ***PPE can NEVER be your only means of protection***

Worker Sign On	
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Printed Name	**Signature**
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Portable Generator Operation**	**Control #:**	**01-01-08-03**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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:	Spill kit Fire extinguisher Eye wash and rinse 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)*
1. Selecting proper generator and electrical connections	1a. Inadequate power for needs	6	1a. Verify that the generator will provide sufficient wattage to safely operate the equipment you need.	2
	1b. Overheating/fire of electrical cords	6	1b. Select a UL rated 3 pronged heavy- duty outdoor construction rated extension cord with proper wire gauge to handle the load.	2
	1c. Lack of sustainability causing fire hazards	8	1c. When long term power is needed, evaluate alternative sources for sustainability.	4
On-Site Edits:				
2. Familiarize yourself with generator hazards and prevention measures	2a. Not recognizing the potential hazards associated with a generator (fires, sprains/strains, electric shock, etc.)	**12**	2a. Read Owners Manual!	2
On-Site Edits:				
3. Load and unload generator	3a. Sprains, strains, exertion, pinch points	**10**	3a. Stretch and flex before attempting to load or unload. Know the weight of the generator and your personal ability. Use assistance. Be aware of hand placement.	6
		6	3b. Always allow a generator to cool completely before attempting to load/unload.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Portable Generator Operation**	**Control #:**	**01-01-08-03**

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)*
	3b. Burns to hands from hot parts			
On-Site Edits:				
4. Position & setting up generator	4a. Carbon monoxide poisoning & entrainment of Carbon monoxide gas into adjacent buildings/structures	**15**	4a. NEVER OPERATE A GENERATOR INDOORS. Direct generator exhaust away from personnel and work area. Know the symptoms of Carbon Monoxide poisoning including headache, nausea, dizziness, fatigue and shortness of breath. Leave area immediate if symptoms are experienced. Set generator away from doors, windows, and potential entrainments sources such as air intakes, HVAC systems, etc.	4
	4b. Electric shock	**12**	4b. Verify that generator is grounded using a grounding rod and that it is equipped with a Ground Fault Circuit Interrupter.	4
	4c. Nearby materials catching fire	8	4c. Position generators away from flammable/combustible materials. Routinely inspect all areas where generators are positioned to verify that area is kept clear of combustible materials.	4
	4d. Noise-related hearing loss	6	4d. Position generator as far away as possible from workers. Use barriers to deflect noise where possible.	2
On-Site Edits:				
5. Inspect generator and check fluids	5a. Fires from malfunction	9	5a. Inspect the generator for any signs of damage, fuel or oil leaks, etc.	3
	5b. Mechanical failure from low oil	8	5b. Verify that oil is at appropriate level and appears clean	4
On-Site Edits:				
6. Fuel generator	6a. Fires from fueling	**12**	6a. Allow generator to cool for a minimum of 30 minutes after operation before refueling. Keep a portable ABC fire extinguisher in the fueling area. No open flames allowed within 50' of fueling operations.	4
	6b. Fuel spills	8		8

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Portable Generator Operation**	**Control #:**	**01-01-08-03**

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)*
	6c. Splash of fuel to eyes/face	6	6b. Store fuel in an ANSI approved container of no more than 5 gallons Have a spill kit available in case of spills. Fuel and store fuel in a secondary containment. 6c. Wear safety glasses when fueling. Have eyewash and clean rinse water available in case of splash.	6
On-Site Edits:				
7. Starting and operating generator	7a. Electric shock from improper use	**12**	7a. Do not start a generator when it is raining or when you are wet. Verify that generator is equipped with a GFCI. Inspect all equipment to be attached to the generator including tools & electrical cords prior to attaching to the generator.	4
	7b. Exertion/strain/sprain from pull starting	4	7b. Pull cord start generators can be difficult to start, especially if cord is old or gummy. Make sure pull cord is in good condition upon inspection. Get an electric – start generator if possible.	2
On-Site Edits:				
8. Periodic maintenance	8a. Fires and mechanical failure from inadequate maintenance	6	8a. Verify ongoing inspection and scheduled maintenance for owned and leased equipment. The maintenance schedule should be presented in the Owner's Manual but routinely should include oil and spark plug change, air filter replacement, ensuring the battery is properly charged and that battery connections are cleaned, the equipment is started every 30 days or so, and that it is drained of fuel when not in use.	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Portable Generator Operation	Control #:	01-01-08-03

All Employees:

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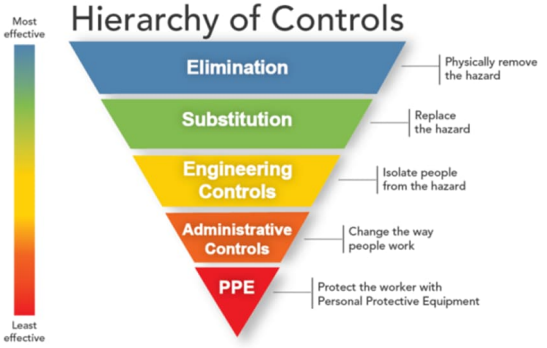
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Printed Name	**Signature**
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Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	**Residential Entry/ Work**	**Control #:**	

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	12/19/2025
Permits Required? (list):	Site Access Agreement (SAA) per NYSDEC Contract Requirements	**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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. Entering Private Residence	1a. Occupant unaware of upcoming activity	9	1a. Conduct outreach activities consisting of emails to property owner followed up by phone calls to confirm appointment; and track these activities in a log. Confirm owner has received and signed off on acknowledge/ consent form for property access. Have at least two (2) people from AECOM and/or Subcontractor/ NYSDEC enter the residence during activities.	4
	1b. Slips/ trips/ falls	10	1b. Inspect and clear walking path prior to entering. Keep one hand free for balance.	4
On-Site Edits:				
2. Working in Private Residence.	2a. Injury from pet (e.g., bite, etc.)	12	2a. Have owner/ occupant restrain pet via leash, cage, etc.	3
	2b. Injury to occupant (e.g., fall, equipment strike, etc.).	12	2b. Make sure occupant(s) are at safe distance from activities.	3
	2c. Injury from improperly stored items/ containers (e.g., spill, etc.)	9	2c. Have owner/ occupant secure items/ containers prior to entering room/ space.	3
On-Site Edits:				

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Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	**Residential Entry/ Work**	**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. Leaving Private Residence	3a. Slips/trips/falls	**10**	3a. Inspect and clear walking path prior to leaving. Keep one hand free for balance.	4
On-Site Edits:				
4.	4a.		4a.	
On-Site Edits:				
5.	5a.		5a.	
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	

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Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	**Residential Entry/ Work**	**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 Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	Residential Entry/ Work	Control #:	

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

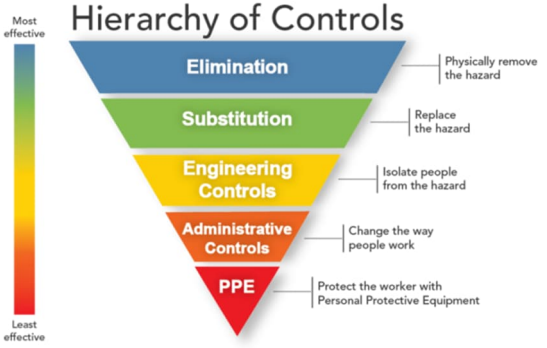
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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Site Walk – Construction/Demolition/Rail Site	**Control #:**	01-01-10-01

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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 #:**	**01-01-10-01**

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 #:**	**01-01-10-01**

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 #:	01-01-10-01

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

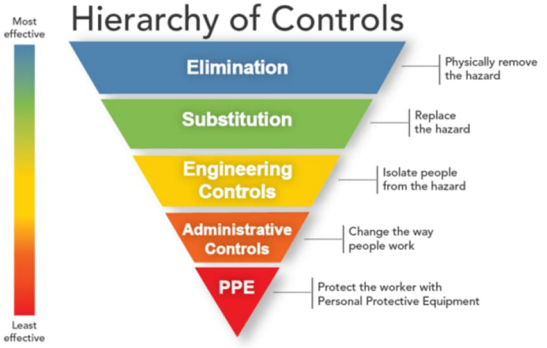
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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.	
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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:	**Summa Canister Sampling**	**Control #:**	**01-01-22-04**

Project Name:	**6 Old River Road**	**Client:**	NYSDEC	**Date:**	10/15/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd, Glenmont, NY 12077		

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:	Summa canister Wrenches Tubing

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. Set up equipment	1a. Muscle strain	6	1a. Use proper precautions (lift with legs, not back) when lifting equipment into/out of vehicle. If lifting >50 lbs, use the buddy system. Avoid twisting, stooping, and/or extended reaching positions when handling or moving equipment.	4
	1b. Equipment damage	3	1b. Use a solid work surface when assembling summa canisters to avoid dropping or damaging equipment. Work from the ground surface, floor, or the tailgate of the truck when applicable. Adhere to laboratory assembly instructions. Use correct size wrenches to connect fittings. Ensure wrenches are properly seated on fittings prior to loosening or tightening fittings.	2
	1c. Pinch points, lacerations	6	1c. Wear leather gloves to prevent hand injury in case the wrench slips off a fitting or while cutting tubing.	1
	1d. Tool/equipment failure caused by use	3	1d. Conduct physical inspection of all equipment. Worn or broken tools should be repaired or replaced.	1
On-Site Edits:				
2. Collect Sample	2a. Slips, trips, falls	6	2a. Maintain clean and organized work area; keep walking paths clear of equipment and debris.	3

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	**Summa Cannister Sampling**	**Control #:**	**01-01-22-04**

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. Injury from poor ergonomics	6	2b. Maintain proper body positioning/good ergonomic form. Avoid stooping and twisting.	2
On-Site Edits:				
3. Pack Sample Cooler	3a. Muscle strain	6	3a. Use proper lifting techniques (lift with legs, not back) and use buddy system if lifting items >50 pounds. Avoid twisting, stooping, and/or extended reaching body positions when moving full coolers.	2
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Summa Cannister Sampling	Control #:	01-01-22-04

All Employees:

STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

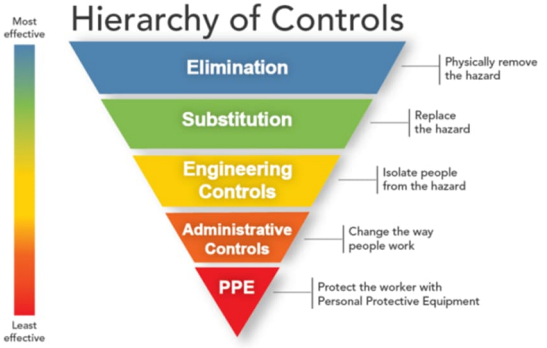
Be alert, recognize and communicate any changes in scope, personnel or conditions at the worksite to the supervisor.

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?***

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- ***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 Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:	Click here to enter text.	**Control #:**	Click here to enter text.

Project Name:	6 Old River Road	Client:	NYSDEC	**Date:**	12/19/2025
Permits Required? (list):		**Work Location:**	6 Old River Rd,Glenmont, NY 12077		

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!				
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)*
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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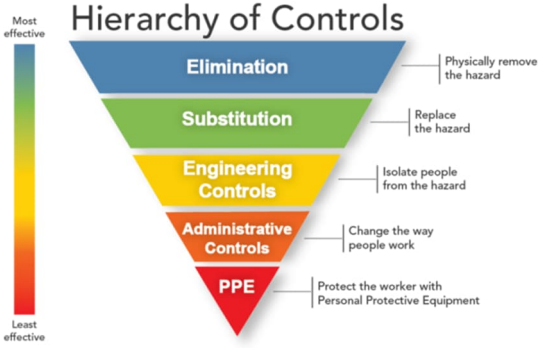
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Americas

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: 12/19/2025	**Project Name/Location:** 6 Old River Road	**Project Number:** 60770465

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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		In & Fit	Out & Fit
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		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(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:* Click here to Identify OR type N/A
- ☐ *Other:* Click here to Describe OR type 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

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

Daily Drilling, Boring & Direct-Push Equipment Inspection

S3AM-321-FM1

Instructions

1. **This form is to be completed and retained in accordance with Drilling, Boring & Direct Push Probing – Americas S3AM-321-PR1.**
2. **Each shift shall inspect all applicable items. If an unsatisfactory condition (fail) is observed, suspend the operation of the equipment, and report the condition to the site supervisor immediately.**
3. **The completed form shall be retained in the project files.**

Rig Information

Site / Project Name		**Rig Inspector (Name/Company)**	
Rig Type	Rotary/Auger Drilling Rig ☐	Direct Push Type (DPT) ☐	
Owner		**VIN#**	
Year/Make		**Mileage**	
Model		**Drill Hrs**	

Checklist	Pass	Fail	N/A
Emergency Equipment / Devices / Switches			
Kill switches are located and accessible to workers on both sides of the rotating stem. **NOTE:** Location and number of switches depend on the rig manufacturer; please refer to owner's manual (DPT typically has one switch on control panel).	☐	☐	☐
Kill switches installed by the manufacturer, alarms, and other devices (e.g., positive air shut-off valve) tested and in operable condition. All workers familiar with location and operation of devices. NEVER BYPASS, DISABLE, OR REMOVE KILL DEVICES.	☐	☐	☐
First aid kit adequate and on equipment / readily available.	☐	☐	☐
Absorbent materials on equipment / readily available (spill response).	☐	☐	☐
A fire extinguisher of appropriate size is located on drill rig and readily available/accessible for drilling crew (recommended 20 lbs.).	☐	☐	☐
Protective Guards			
Drive shafts, belts, chain drives, and universal joints are guarded to prevent accidental insertion of hands, fingers, or tools.	☐	☐	☐
Cables			
Cables on drill rig free of kinks, frayed wires, birdcages, flat spots, grease, and worn or missing sections.	☐	☐	☐
Cables are terminated at the working end with a proper eye splice; either swaged, coupled, or using cable clamps.	☐	☐	☐
Cable clamps are installed with the saddle on the live or load side. Clamps are not alternated and are of the correct size and number for the cable size.	☐	☐	☐
Wire ropes are not allowed to bend around sharp edges without cushion material.	☐	☐	☐

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Checklist	Pass	Fail	N/A
Pulleys and Cable Winches			
Pulleys are not bent, cracked, or broken.	☐	☐	☐
Pulleys operate smoothly and freely, without resistance.	☐	☐	☐
Motor is mounted in correct location and tightly secured to drill rig.	☐	☐	☐
Winch capable of being placed in the free spool (unwind smoothly) and locked position correctly, demonstrating that the cable is suitable for lifting during drilling operations.	☐	☐	☐
Safety Latches			
Hooks installed on hoist cables are the safety type with a functional latch to prevent accidental separation.	☐	☐	☐
Safety latches are functional and completely span the entire throat of the hook and have positive action to close the throat except when manually displaced for connecting or disconnecting a load.	☐	☐	☐
Flights / Augers / Reamers			
Flights / Augers / Reamers are not bent, cracked, or broken. NOTE: Flights / Augers / Reamers failing inspection must be removed from jobsite.	☐	☐	☐
Flights are blunt to prevent the risks of cuts.	☐	☐	☐
Auger keys are not bent, cracked/fractured, excessively worn, or otherwise damaged.	☐	☐	☐
Auger bolt holes and threads are not damaged.	☐	☐	☐
Inspect flights/augers for metal burns. NOTE: Burrs must be filed to flat surface.	☐	☐	☐
Augers / Reamers lying flat on the ground (avoid stacking).	☐	☐	☐
Augers / Reamers over 50lbs (22.7kg) moved mechanically. (Avoid manual lifting).	☐	☐	☐
Drill String			
Appropriate break out tool(s) available.	☐	☐	☐
Rod box and power vice operating smoothly and freely.	☐	☐	☐
Drill string is not bent and do not have any cracks/fractures.	☐	☐	☐
Drill string connections (e.g. pins, threads, couplers) are of the proper type, are not bent, have no cracks/fractures, and are not excessively worn.	☐	☐	☐
Swivel connectors (for trailing horizontal drill stem) lubricated and freely rotating.	☐	☐	☐
Mast			
Mast is free of bends, cracks, or broken sections.	☐	☐	☐
All mounting hardware (pins, bolts, etc.) in place.	☐	☐	☐
No moving of drill rig or maintenance/repairs while mast is in vertical position.	☐	☐	☐
Hammering Device			
Hammer free of cracks, fatigue, or other signs of excessive wear.	☐	☐	☐
Hammer connections are secure.	☐	☐	☐

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Checklist	Pass	Fail	N/A
Leveling Devices			
Outriggers move in/out and up/down smoothly and freely while using controls on drill rig, with no hydraulics leaks.	☐	☐	☐
Outriggers are extended prior to and whenever the mast is raised off its cradle. Outriggers must maintain pressure to continuously support and stabilize the drill rig (even while unattended).	☐	☐	☐
Outriggers are properly supported on the ground surface to prevent setting into the soil (use of outrigger support pads).	☐	☐	☐
Controls			
Controls are intact, properly labeled, have freedom of movement, and have no loose wiring or connections.	☐	☐	☐
Controls are not blocked or locked into an operating position.	☐	☐	☐
Installed lights, signals, gauges, and alarms operate properly.	☐	☐	☐
Lifting Devices			
Slings, chokers, and lifting devices (straps, not chains) inspected before using and are in proper working order. **NOTE:** Damaged units are labeled and removed from jobsite.	☐	☐	☐
Shackles/Clevises are in proper working order with pins/screws in place that is to be used while lifting.	☐	☐	☐
Cables and lifting devices are not operated erratically or with a jerking action to overcome resistance.	☐	☐	☐
Hydraulic System			
Hydraulic lines are secure, in good condition with no signs of excessive wear, and not leaking. **NOTE:** Check while pressurized.	☐	☐	☐
Hydraulic lines are not in a bent or pinched position causing additional fluid restrictions/pressures.	☐	☐	☐
Hydraulic oil reservoir has appropriate amount of oil and not leaking.	☐	☐	☐
Documentation available to confirm that pressure relief valve was checked during shop maintenance activity and noted on maintenance log.	☐	☐	☐
Pump Lines (water, grout, etc.)			
Suction/Discharge hoses, pipes, valves, and fittings are secured and not leaking.	☐	☐	☐
High pressure hoses have a safety chain, cable, or strap at each end to prevent whipping in the event of a failure.	☐	☐	☐
Ladders			
Drill rig has a permanently attached or proper portable ladder to be used for access to drilling platform.	☐	☐	☐
Ladders and platforms not to be used for tool storage- keep ladders and operator platforms clear during drilling.	☐	☐	☐
Tires / Tracks			
Tires / Tracks on rig are not excessively worn and free of any debris or foreign material.	☐	☐	☐

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Checklist	Pass	Fail	N/A
General			
General condition – exterior (no structural damage, no loose bolts, platform tidy, etc.)	☐	☐	☐
General condition – interior (cab clean, tidy)	☐	☐	☐
Drill rig meets regulations for transport on state/federal highways (inspection sticker, license plate, etc.).	☐	☐	☐
Rig is of appropriate size to meet job requirements.	☐	☐	☐
Maintenance log available for previous 3 months to confirm proper maintenance/inspection.	☐	☐	☐
Exhaust			
Exhaust system is free from defect and routes engine exhaust away from drill rig workers.	☐	☐	☐
Fuels			
Fuel stored in an approved and properly labeled container.	☐	☐	☐
Fuel transfer lines free from signs of excessive wear and not leaking.	☐	☐	☐
Refueling and transferring of fuel is performed in an approved area with sufficient containment to prevent spillage.	☐	☐	☐
Exclusion/Work Zones			
The exclusion/work zone is centered over the borehole (and if applicable, bore exit point) and the radius equal to or greater than the height of the mast (measured from ground level).	☐	☐	☐
The exclusion/work zone is clear of tripping hazards, or the hazards are documented with appropriate controls on the Task Hazard Assessment.	☐	☐	☐
The exclusion/work zone communicated to concurrent/adjacent operations to prevent overlap of work zones or line of fire.	☐	☐	☐
Subsurface Utilities / Installations and Overhead Obstructions			
Subsurface utilities / installations have been confirmed as identified and cleared through site observation and review of the completed S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.	☐	☐	☐
Except where electrical distribution and transmission lines have been de-energized and visibly grounded, drill rigs will be operated proximate to under, by, or near power lines in accordance with the Minimum Approach Distance (MAD).	☐	☐	☐
Rig Repairs			
Repairs, when possible, are conducted offsite to reduce the risk of any onsite incidents.	☐	☐	☐
Specialized PPE			
When working at elevated heights, workers are to wear a fall restraining device attached in a manner to restrict falls to less than six feet (1.83 meters).	☐	☐	☐
When working in wet/slippery conditions, all workers have a lug-type sole or similar slip resistant sole, on their safety footwear to prevent slipping.	☐	☐	☐

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Comments

Signature of Inspector: **Date:**

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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: _____

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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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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

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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

NYSDEC Site No. 401088 / WA-60
6 Old River Road, Glenmont, Albany County, NY

December 2025

Rev. February 2026

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
- Health and Safety Plan (HASP) dated December 2025 and revised in February 2026.

1. Planning

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.

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:
    - **Fixed Site:** Replenishment water supply shall be located at the work vehicle. Employees will have access to replenishment during working hours and may be 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

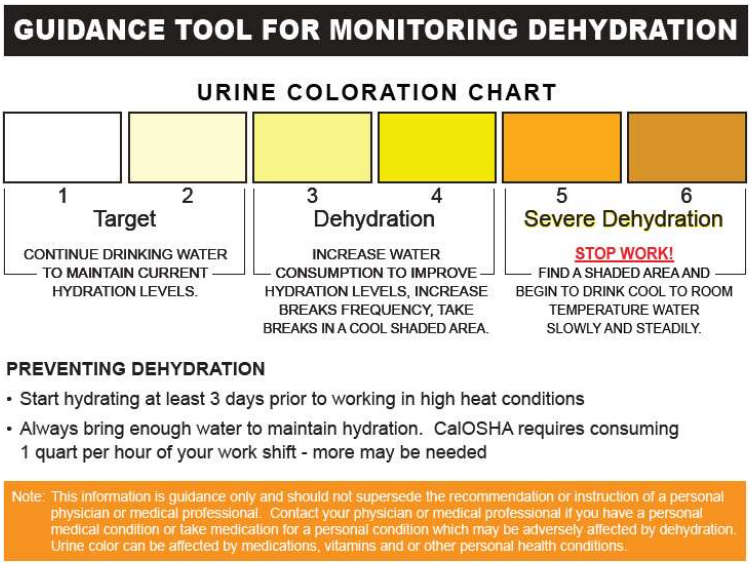
The 2006 Cal/OSHA Heat Illness Case Study showed that, although 90% of the worksites had drinking water at the site, 96% of the employees suffering from heat illnesses were dehydrated.

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

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.

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.

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)

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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 – °F (°C)			
	Light Work	**Moderate Work**	**Heavy Work**	**Very Heavy Work**
No Specified requirements	< 80°F (26.67°C)	< 75°F (23.88°C)	< 70°F (21.11°C)	< 65°F (18.33°C)
15-minute break every 90 minutes of work	80–90°F (26.67–32.2°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)

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).
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);
- 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

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- 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.

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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

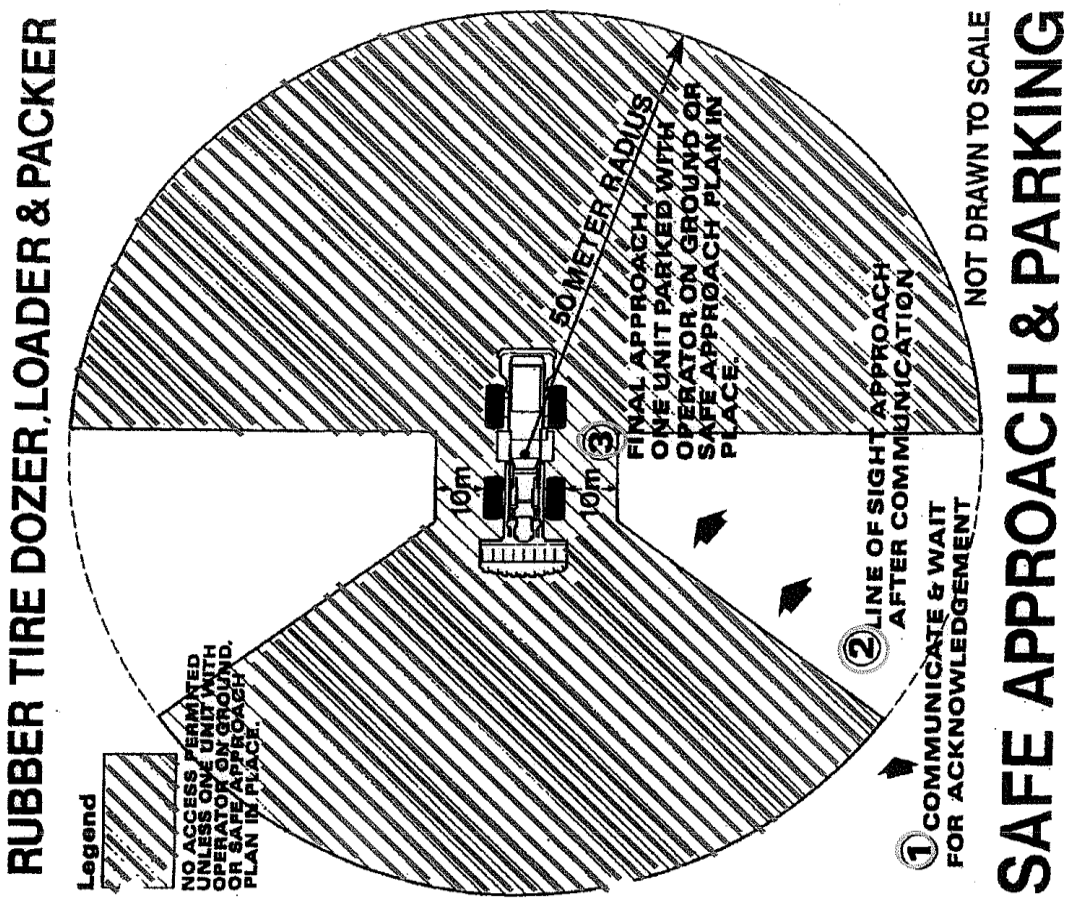
6.1 Never stand under a raised boom.

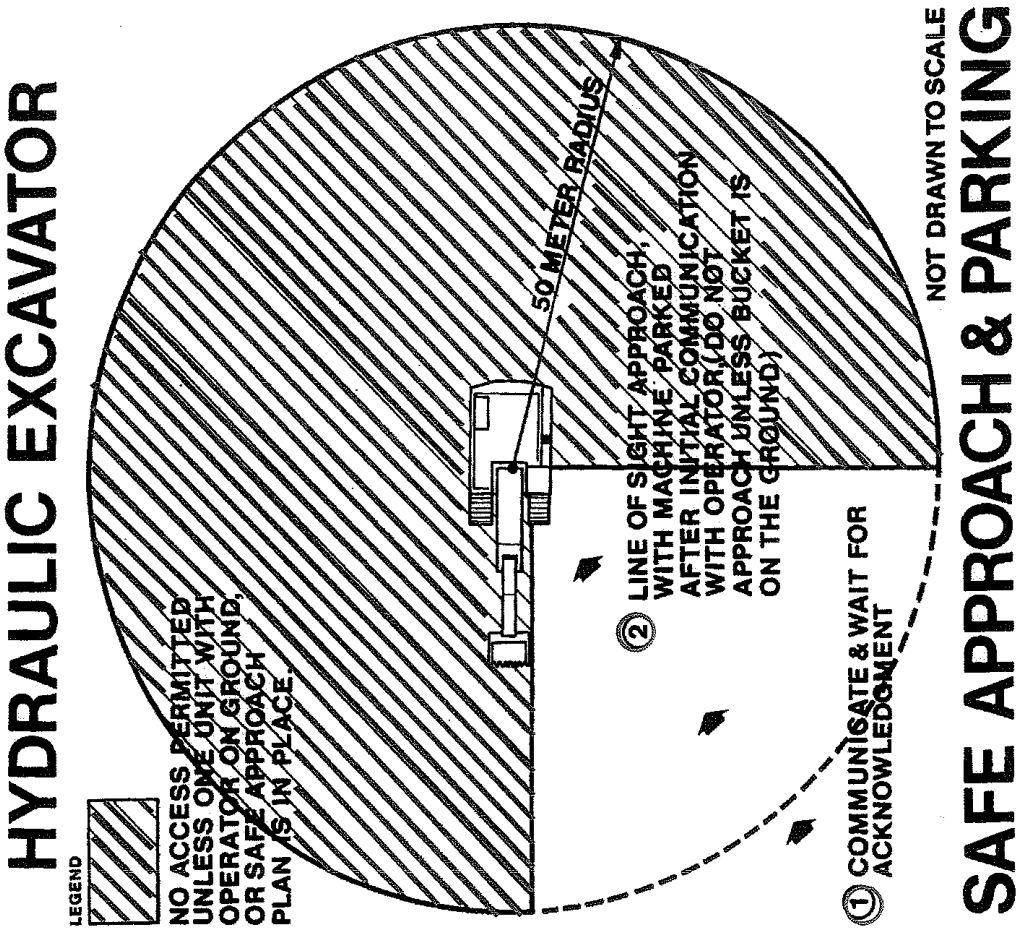
6.2 Pay close attention to power cords for potential tripping hazard and equipment entanglement.

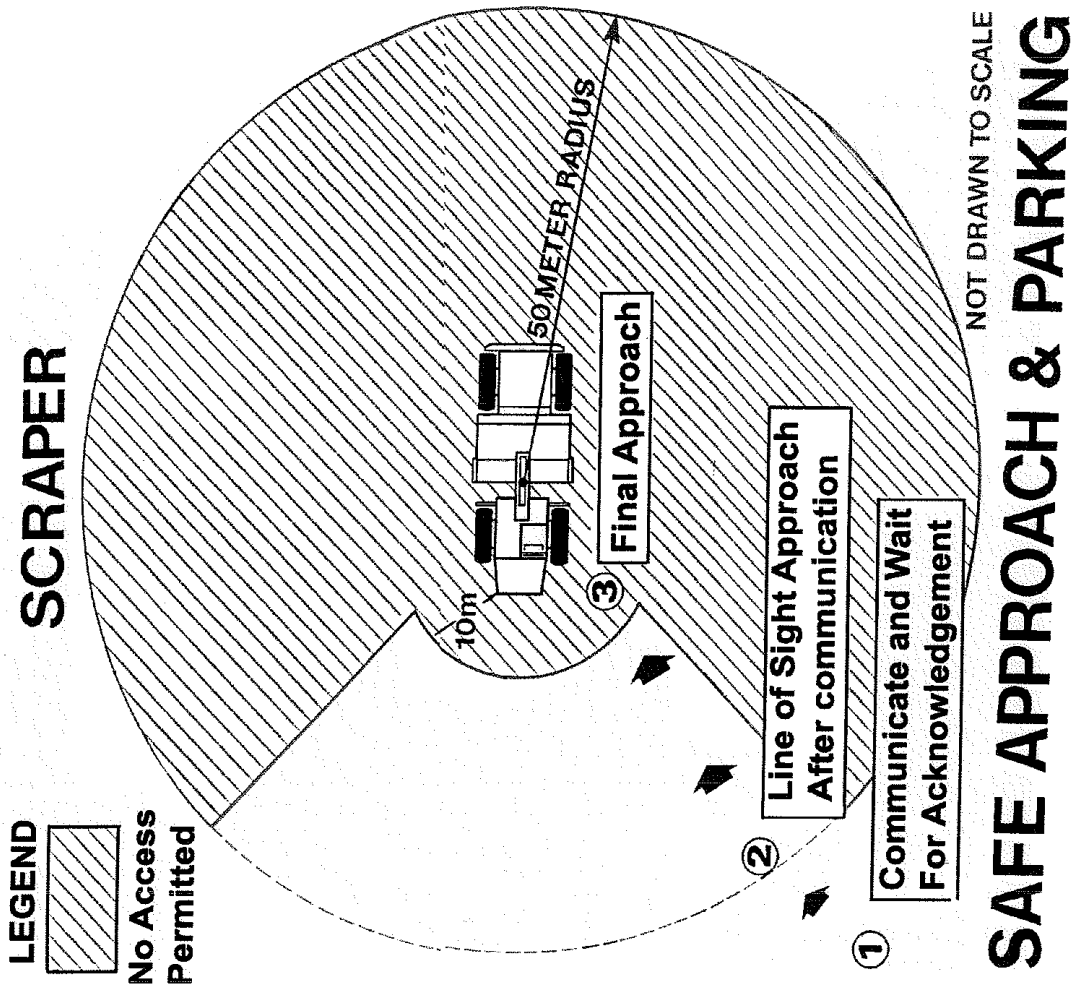
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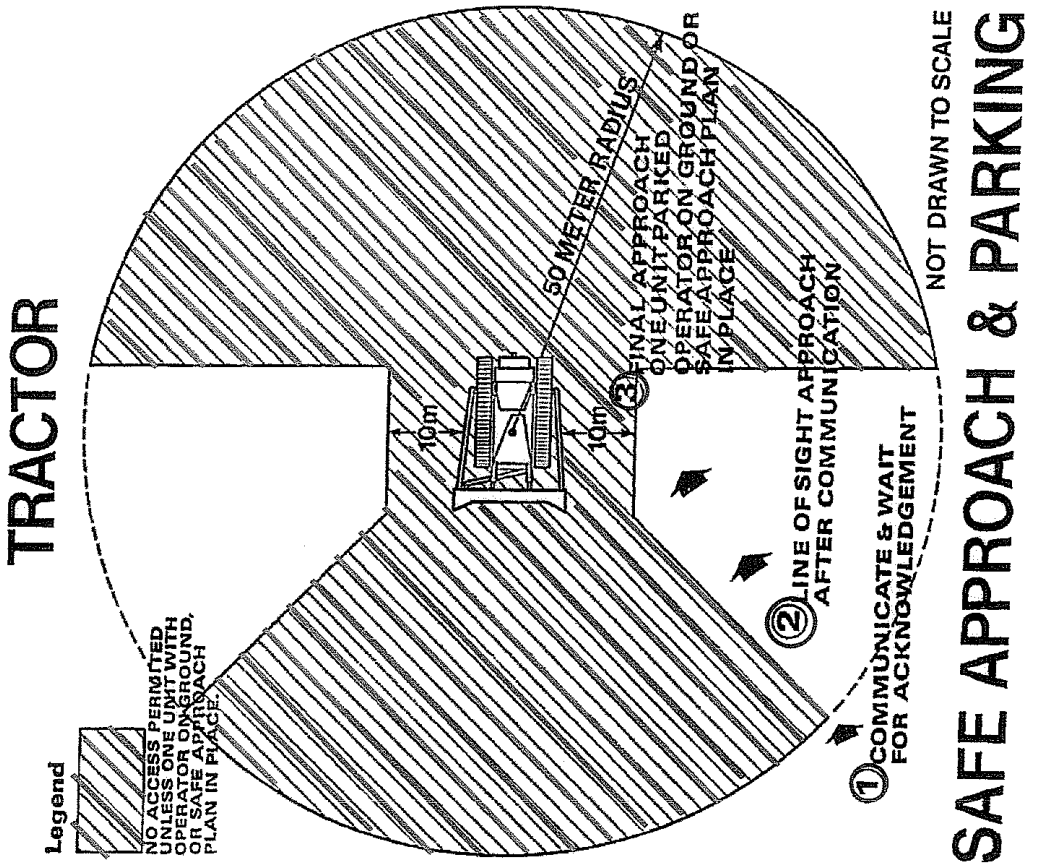
Operator Line of Sight

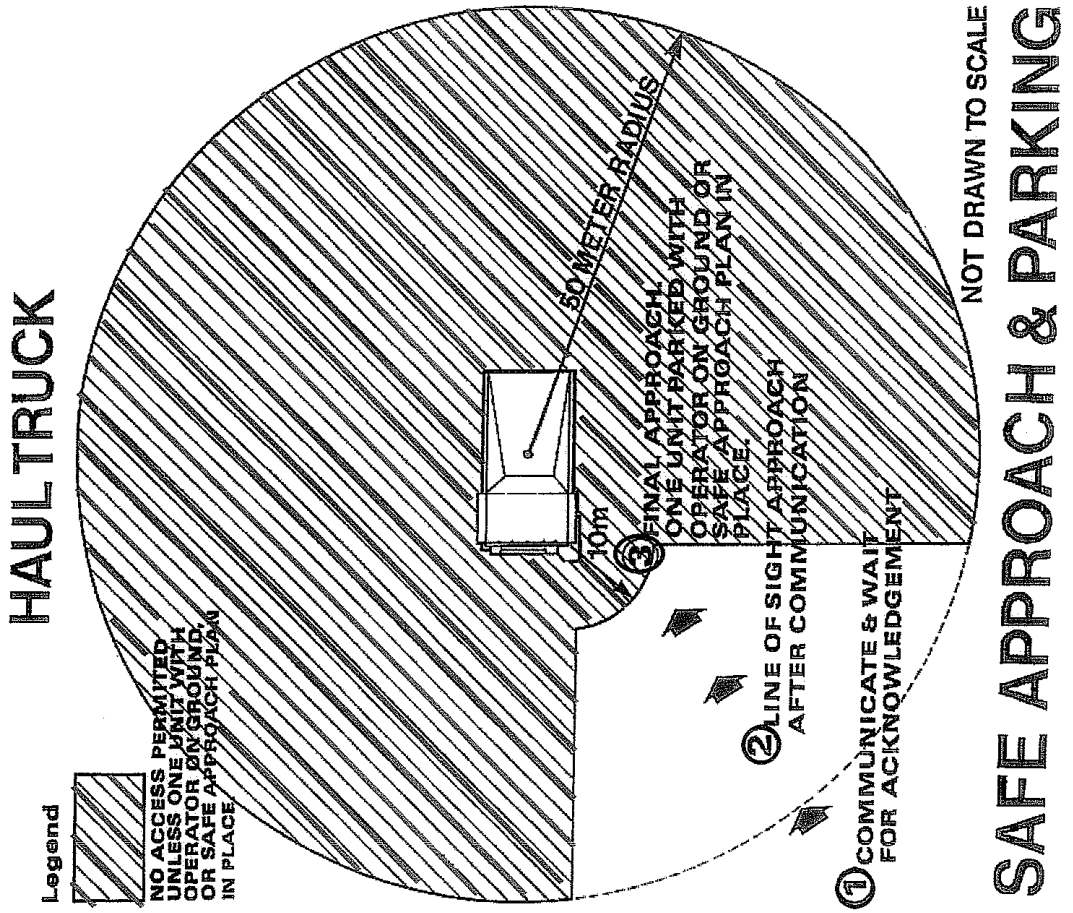
S3AM-309-ATT2

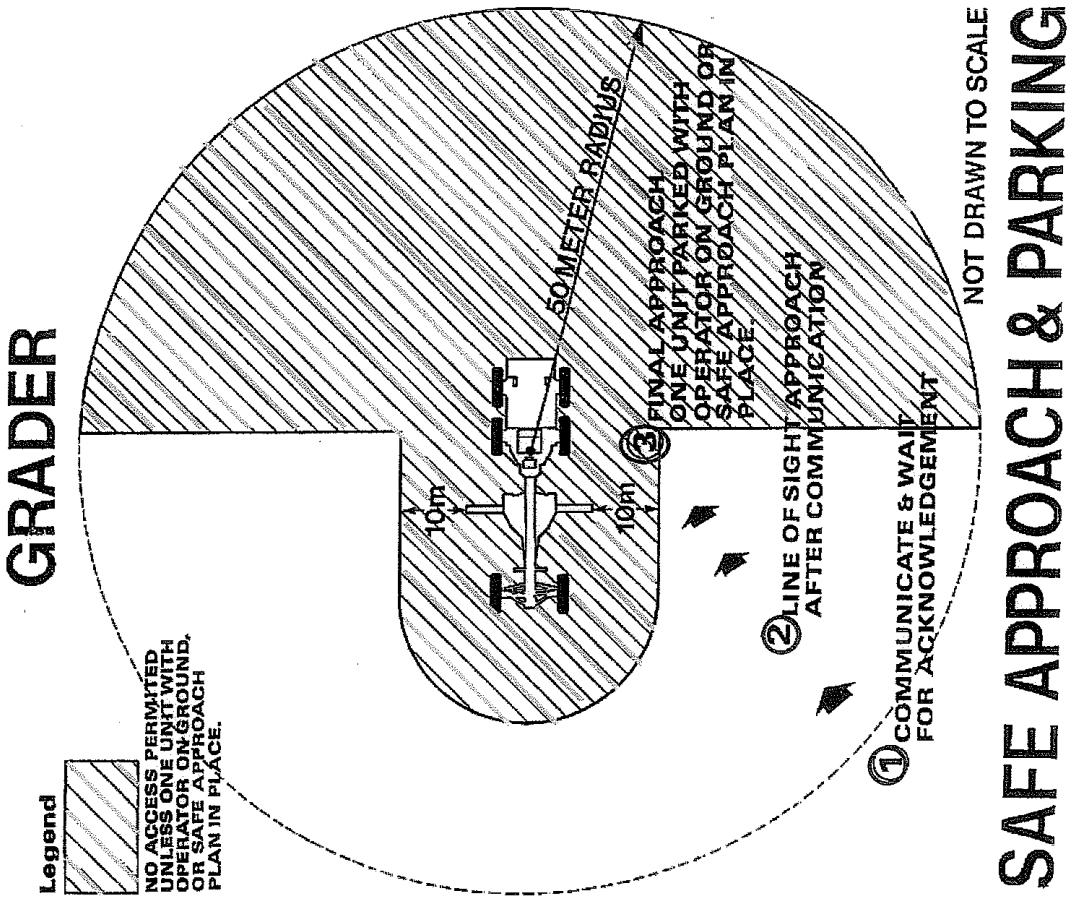



HYDRAULIC EXCAVATOR
LEGEND
NO ACCESS PERMITTED UNLESS ONE UNIT WITH OPERATOR ON GROUND, OR SAFE APPROACH PLAN IS IN PLACE.
50 METER RADIUS
② LINE OF SIGHT APPROACH, WITH MACHINE PARKED AFTER INITIAL COMMUNICATION WITH OPERATOR. DO NOT APPROACH UNLESS BUCKET IS ON THE GROUND.)
① COMMUNICATE & WAIT FOR ACKNOWLEDGMENT
NOT DRAWN TO SCALE
SAFE APPROACH & PARKING

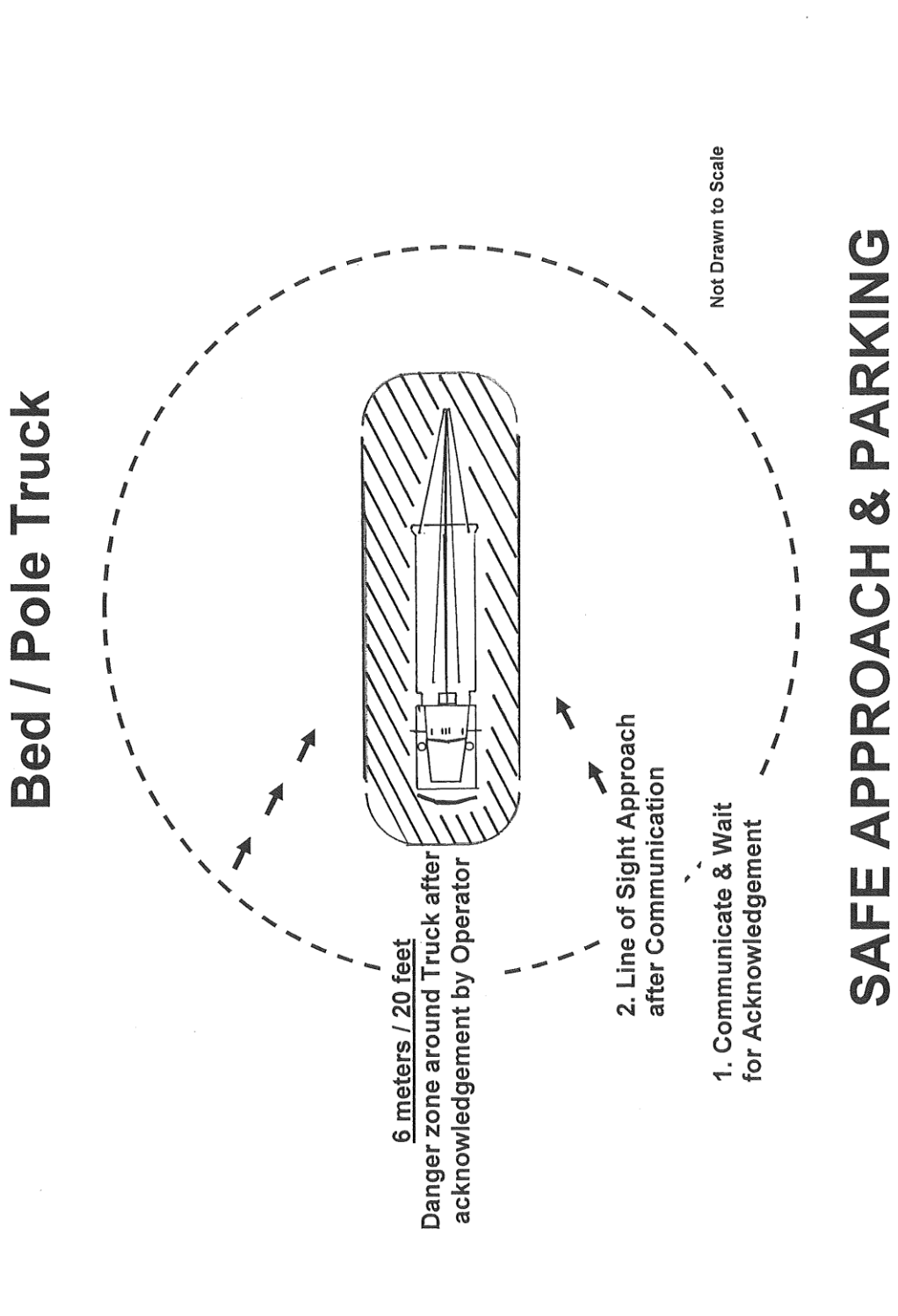

SAFE APPROACH & PARKING
NOT DRAWN TO SCALE
SCRAPER
50 METER RADIUS
10m
1 Communicate and Wait For Acknowledgement
2 Line of Sight Approach After communication
3 Final Approach
LEGEND
No Access Permitted


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.

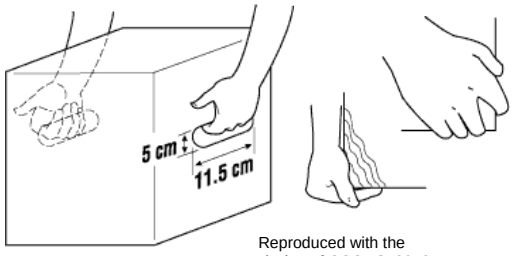
4.4.3 Assistance with training or training materials is available through the Safety, Health and Environment staff.

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.

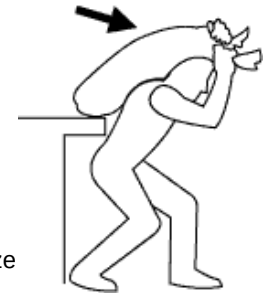
4.9.2 Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a co-worker, remember to:

- 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:

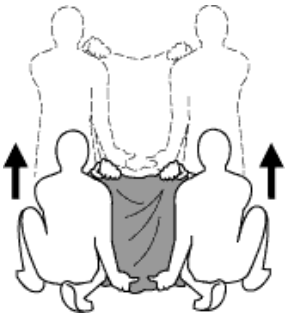
- Move the sack to the edge of the platform.
- Put back against the sack.
- Grasp with both hands on the upper corners of the sack.
- Ease the sack onto the back, bending hips and knees before taking the weight.
- Keeping the back straight, stand up, straighten hips and knees and stabilize the sack.
- 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

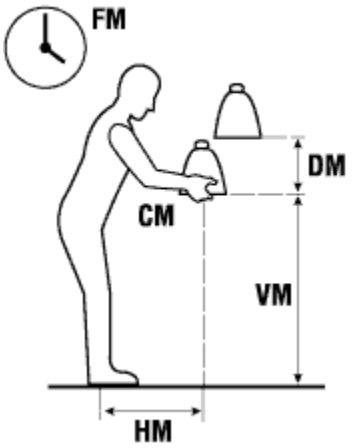
Americas

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:

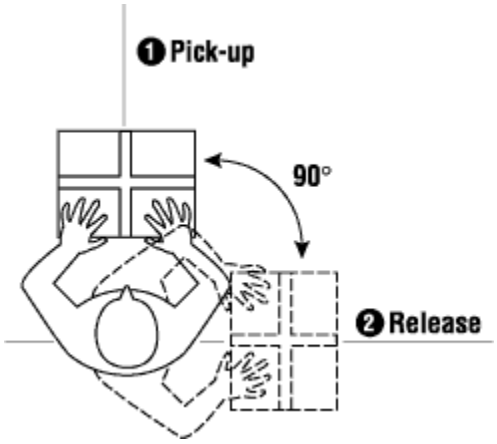


- The horizontal distance (H) the load is lifted (distance of hands from midpoint between ankles),
- The starting height of the hands from the ground (V),
- The vertical distance of lifting (D),
- The time between lifts or frequency of lifting (F),
- The angle of the load in relation to the body (e.g., 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

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.

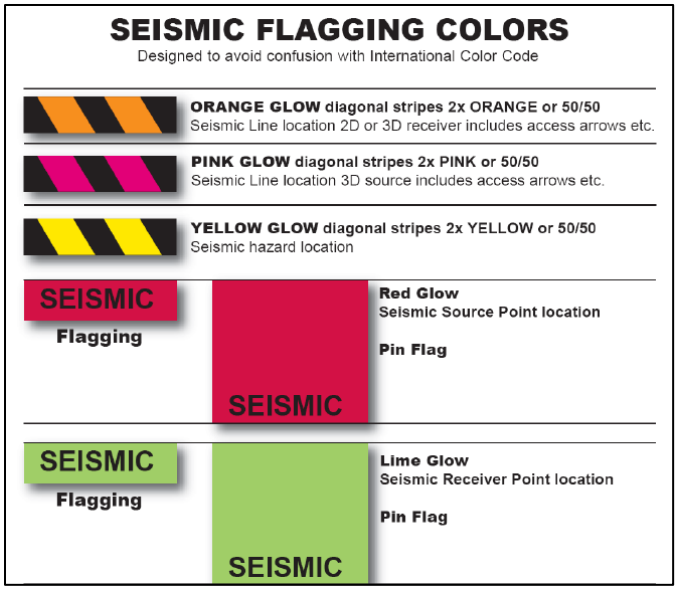
4.8 Uniform Color Coding

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

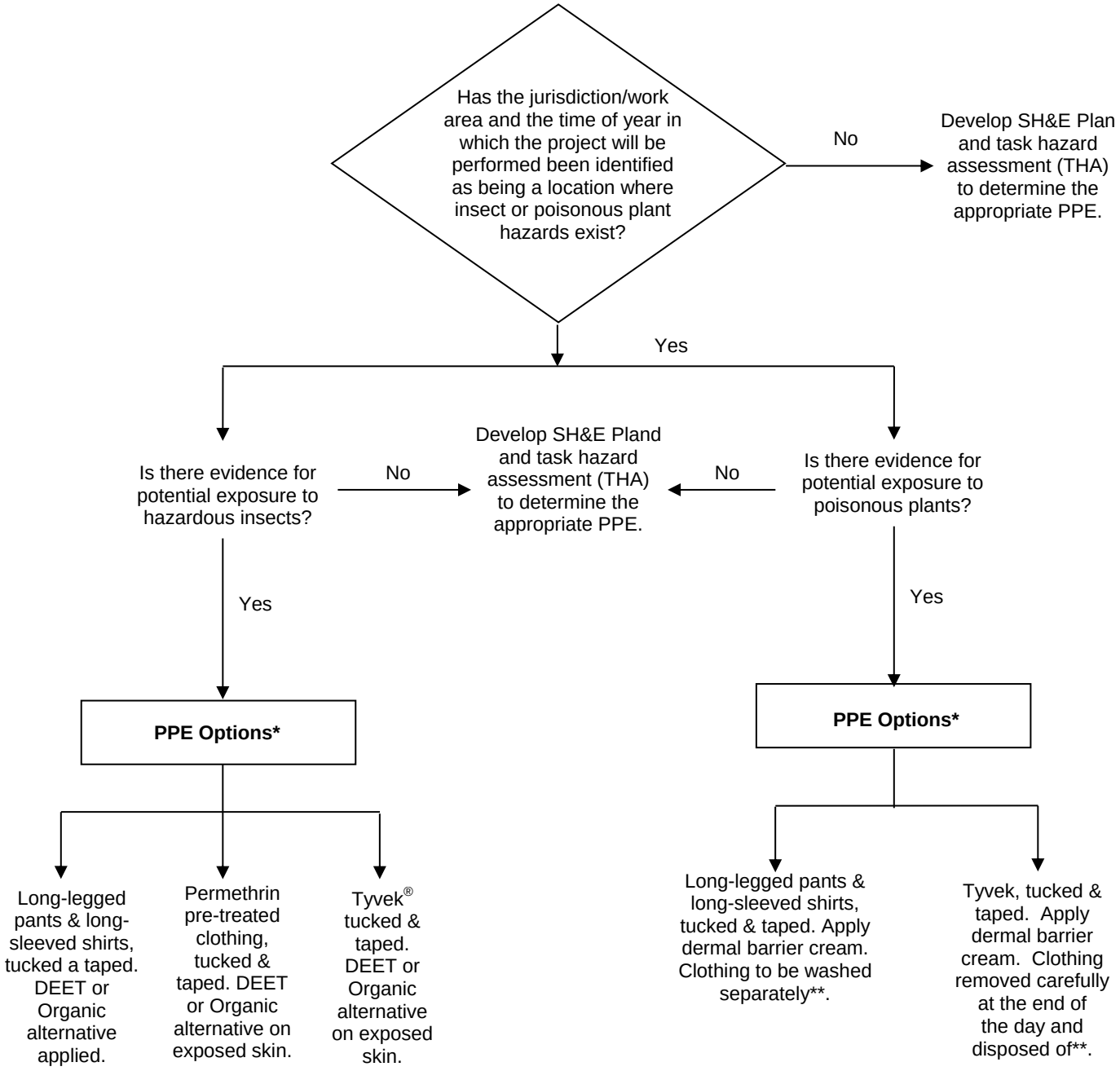
6.11 S3AM-313-ATT11 Small Mammals

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



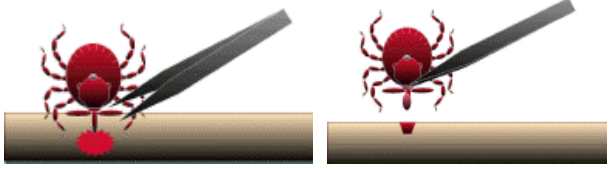
2.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.

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.

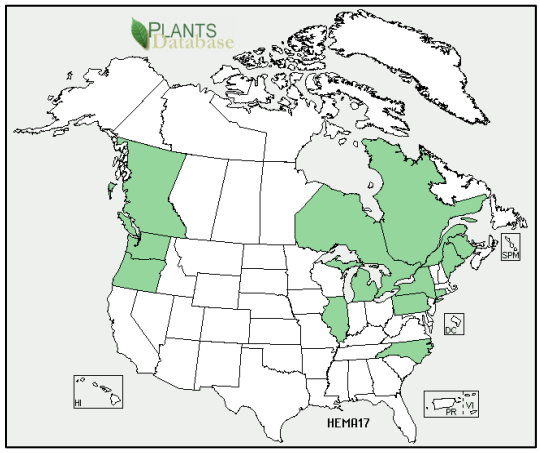
1.3 It should be noted that each time an employee is exposed to urushiol, it increases the severity of the reaction they will have in subsequent exposures.

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

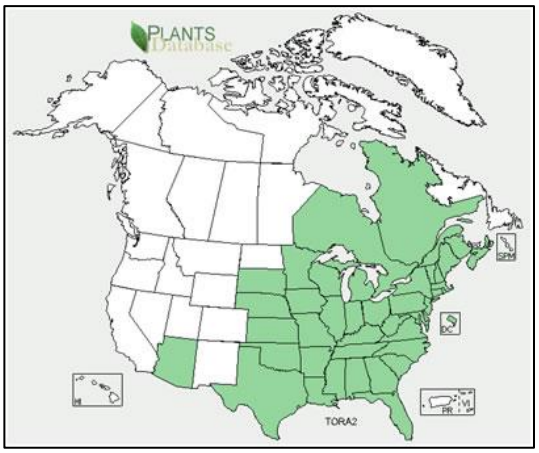


Image obtained from www.cdc.gov

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 Alone

S3AM-314-PR1

1.0 Purpose and Scope

1.1 This procedure establishes the requirements for communication and accountability between personnel at a work site to reduce the potential for incidents occurring to one employee without help readily available and to facilitate the rapid mustering of assistance to employees in the event of an emergency.

1.2 This procedure applies to all AECOM America-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 **Buddy System** – A system of organizing employees at a work site in such a manner that each employee is accompanied by or in communication with at least one other employee or is escorted by a client or contractor representative during work site activities.

2.2 **Controlled Work Areas** – One or more designated work areas on a field project site where high risk activities and/or strictly defined operations take place. Such controlled work areas include, but are not limited to, remediation or construction sites; a restricted radius where a critical lift operation will take place could be declared a controlled work area. On a HAZWOPER site, the controlled work area is divided into the exclusion zone, the contaminated reduction zone, and the support zone.

2.3 **Working Alone** – Performing work with no line of sight or direct voice communication with another person who is aware of your assignment and capable of initiating emergency response.

3.0 References

3.1 S3AM-005-PR1 Driving

3.2 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager or Supervisor**

- Establish if employee is permitted to work alone, through evaluation of employee's experience, training and any personal limitations (e.g. life-threatening allergic reactions).
- Provide the resources, communication devices, emergency response plans, and check-in procedures as listed in the Task Hazard Assessment (THA) or SH&E plan, etc. necessary so that employees are not working alone or have a buddy system in place.
- Act as point of contact if employees miss their check-in.

4.1.2 **Employees**

- Complete training as required to prepare for working alone.
- Confirm emergency contacts are provided to the Manager or supervisor in case of an emergency.
- Establish a buddy system and check in procedure in accordance with the THA or SH&E Plan provided by the Manager and Supervisor.

4.1.3 **SH&E Managers**

- Review and approve relevant planning documents entailing employees working alone and on remote travel.

4.2 General

4.2.1 All projects/programs shall conduct a review of all tasks performed by AECOM to establish specific work alone procedural requirements as defined here. They shall have at minimum a THA and SH&E Plan that has been reviewed by the SH&E Manager.

4.2.2 Employees are discouraged from working alone on any site due to the risk of delayed assistance in the event of an incident. If they will be out of contact with other employees, they shall establish a buddy system or check-in procedure with another employee or responsible person.

4.2.3 Employees working alone or in small crews in remote isolation shall have an effective means of communication including cell/radio/satellite phone as well as established check-in times.

4.2.4 When traveling alone, staff shall take appropriate precautions, including notifying someone of their travel plans as well as carrying a communication device and safety equipment, as appropriate. See *S3AM-005-FM1 Journey Management Plan*.

4.3 No employee shall work by themselves or without a buddy system established if they are conducting a high risk job task.

4.3.1 The following tasks are considered high risk:

- Working at heights > 4 ft. (1.22 m) (Including aerial lifts, snooper trucks, scaffolds, etc.).
- Working in a confined space.
- Working in a trench or excavation.
- Performing tasks requiring lock out/tag out.
- Work on energized equipment.
- Working with electricity.
- Working with hazardous substances or materials (including all HAZWOPER projects).
- Working with material under pressure.
- Working where there is a possible threat of violence, including civil unrest.
- Working in avalanche areas.
- Working on water or ice.
- Working in remote or wilderness isolation.
- Working in a controlled area.
- Extreme heat or cold stress environments.
- Working with power tools/equipment (drill, chainsaw, grinder, etc.).
- Working with/operating heavy equipment or machinery, including drill rigs.
- Working in isolation from first aid services or immediate/emergency assistance.
- Working around mobile equipment.
- Exposure to vehicular traffic (highways, roads, parking lots, etc.).
- All-terrain vehicle work.
- Working on railroads or within 25 ft. (7.62 m) of tracks.
- Any activity/task involving non-voluntary use of respiratory protection, including for site access.

- Working with people diagnosed with Coronavirus or other pandemic diseases.

4.3.2 The following tasks (identified as high risk) may permit working alone provided it can be demonstrated there is no substantial increased risk associated with working alone:

- Working with power tools/equipment (e.g. power drill versus chainsaw).
- Working with material under pressure (e.g. small air compressor versus compressed gasses).

4.4 Office Work

4.4.1 The supervisor shall have in place and shall communicate as part of location specific orientation, its procedures for the safety and security of an employee working alone in the office. Contact numbers to be used in case of emergency are posted at all common gathering areas or major exits.

4.4.2 Employees working in the office after regular working hours or in situations where they are working alone shall keep the entrance to the office locked.

4.4.3 If the building is monitored by a security service, employees working in the office after regular working hours or working alone shall notify the security guard of their presence and anticipated hours. If the building does not have a security service, the employee working alone shall notify their supervisor or a family member or friend if agreed to by their supervisor.

4.4.4 During all working hours, employees shall stay alert to unauthorized entries into the building and to other suspicious activities and shall report them to security or their supervisor immediately.

4.5 Field Work

4.5.1 Prior to work commencing, a THA shall be prepared for all assignments on which employees are to work alone (in accordance with *S3AM-209-PR1 Risk Assessment & Management*). The THA shall consider travel time, weather, available communications, and the impact of working alone when establishing risk ratings of the hazards associated with the task and work environment.

4.5.2 The THA should also consider whether the employee assigned to work alone has sufficient training and qualifications in the tasks to be performed to allow the employee to work safely alone. The employee's personal medical conditions may be considered if the employee has voluntarily made the medical condition known to the Manager or Supervisor.

4.5.3 The THA should identify the controls required for the safety of employees as applicable to the job task and location. Some controls associated with working alone or in remote isolation include a buddy system, standardized check-in times, what to do if a check-in is missed (e.g. worker in proximity attends site, utilizing secondary communication method, etc.), specialized communication devices, and enhanced emergency supply kits.

4.5.4 The THA is completed in addition to the SH&E plan which details the work activities and the procedures to manage the hazards and in accordance with *S3AM-209-PR1 Risk Assessment & Management*.

4.6 Buddy System

4.6.1 When conducting work that has not been identified as high risk, employees shall work with a buddy (another responsible individual) or follow check –in procedures listed in the THA or SH&E Plan.

4.6.2 When conducting high risk work, employees shall work as a buddy system (another responsible individual) at all times.

4.6.3 Once assigned as buddies, personnel shall remain in contact.

4.6.4 When electronic communication devices are used, prior to starting work, a protocol shall be established and agreed to by each buddy to confirm that periodic effective and faultless communications are maintained

4.6.5 When unanticipated conditions develop that do not permit line of sight and direct voice contact, and alternate communication was not established in the THA, Stop Work and notify the Supervisor. If permission from the Supervisor is obtained to continue the work, voice contact shall be achieved using reliable electronic communication devices such as, but not limited to, hand-held radio or cell phone. The THA shall be updated to reflect this change.

4.6.6 If crews will separate once they reach their work site, they shall then be considered to be “working alone”. The buddy system or check-in procedures shall be established, as determined by the work being high risk or non-high risk and as identified in the THA.

4.6.7 Client or contractor personnel may be substituted for an AECOM employee’s buddy only if they are designated by the client or contractor and the AECOM manager or supervisor, and are properly trained to the tasks and the site’s emergency response procedures.

4.6.8 A missed communication event shall initiate the applicable missed check-in actions established in the THA (e.g. worker in proximity attends site, utilizing secondary communication method, etc.) and may trigger emergency response procedures. The results of each communication event shall be documented in the program or project files.

4.7 Check-In Procedures

4.7.1 All field crews shall establish check-in procedures as part of the THA or SH&E Plan prior to leaving the office. These procedures shall be reviewed daily as part of the Task Hazard Assessment review or more frequently if there is a change in work arrangements that could adversely affect a worker's well-being or a report that the system is not working effectively. These procedures shall be confirmed with the assigned Check-In Person daily.

4.7.2 The timing and frequency of those check-in procedures schedule shall be established prior to the initiation of field operations and shall vary depending on the task and location of the work.

4.7.3 If communication is lost between buddies or a check-in time is missed, it shall be assumed that an emergency situation exists, and the site’s emergency response procedures shall be implemented. Site work shall cease until the emergency is resolved and the Supervisor directs personnel to restart work.

4.7.4 If crews will separate once they reach their field site, they will then be considered to be “working alone” and will establish a buddy system with the other members of the crew.

4.7.5 Employees working alone or in small crews in remote isolation will have an effective means of communication system (e.g., cell, radio, satellite phone, global positioning system communicator) as well as established check-in times.

4.7.6 The Check-In Procedure will be reviewed daily as part of the THA review or more frequently if there is a change in work conditions that could adversely affect a worker's well-being or a report that the system is not working effectively.

4.8 Emergency Response Procedures

4.8.1 All field employees and the Check-In Person shall be provided with the location specific Emergency Response Plan. This may be included in the THA or SH&E plan or exist as a separate document.

4.8.2 The Check-In Person shall have access to a route map or understands their anticipated route of travel.

4.8.3 The established contact person shall follow the procedures below, with specifics established in the SWP Plan or THA, if a field employee has missed a check-in:

- First, they shall attempt to make contact with the field employee directly.
- If that fails to provide a response, they shall contact other persons who may have been on site, including client supervisors, or other locations where the field employee might be (e.g., hotel, home, office).

- If the field employee still cannot be located, the emergency contact person notifies the manager or supervisor responsible for the employee.
- Depending on the location and situation, they shall then dispatch another employee, another supervisor, or an appropriate emergency response agency (e.g., police) to travel to the last known location of the field employee.
- If the dispatched responder arrives at the site but cannot locate the field employee, the appropriate public emergency contacts (e.g., police, search and rescue) shall be made and the employee's personal contacts shall be notified by Human Resources.
- If the dispatched responder finds the crew in an emergency situation (medical, environmental, structural, etc.), the appropriate steps shall be taken to isolate the hazard, administer first aid, and contact emergency support services.

4.9 Training

4.9.1 All employees shall receive an initial orientation that includes the hazards and controls associated with working alone.

4.9.2 If working in the wilderness, all field employees shall receive appropriate orienteering training using a map. Basic orienteering and navigation skills can be provided by an experienced employee before work commences. This training must be documented. Refer to the *S3AM-314-ATT1 Wilderness Isolation* instruction for more specifics.

4.9.3 Employees working alone should be trained in First Aid. Consideration should be given to Wilderness First Aid training based on the anticipated work environment.

4.9.4 Employees regularly working in remote, isolated wilderness locations will either participate in a wilderness survival course from a qualified provider (one or two day) or will obtain management approval based on their level of experience/competence in wilderness situations.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-314-ATT1 Wilderness Isolation

Americas

Wilderness Isolation

S3AM-314-ATT1

1.0 Planning

1.1 Working in wilderness isolation presents many more potential hazards and should only be conducted by teams with documented experience, safety plans, and equipment appropriate for the tasks and conditions of the work.

1.2 A safety plan and Task Hazard Analysis will be reviewed by the SH&E Manager.

2.0 Safety Equipment

2.1 All field employees should regularly carry the following on their person:

- GPS Unit.
- Compass.
- Lighter, matches, or a "flint' of fire steel.
- A knife or folding saw.
- Map.
- First aid kit.
- Communication device appropriate to the type of coverage anticipated in the area.

2.2 When hiking long distances, it is recommended that a “mini survival kit” that includes the following items be carried in addition to the items listed above:

- Fire starter (tinder). Cotton balls with lip balm work well, or paper egg cartons with cotton balls and paraffin wax; if buying commercial fire starter, test it after several months.
- A whistle.
- Heavy tinfoil (to melt snow, to cook on, or to boil water in).
- Water and/or portable water purification device (e.g. steri-pens®).
- Some high-energy food.
- Cordage or rope (about 50 feet).
- Bear spray and/or bear bangers.

2.3 When using an ATV or helicopter for isolated work, it is recommended that a survival bag or backpack that can be left at a known muster point be put together. This bag should include the following items:

- Additional fire starter (tinder).
- Matches, fire steel.
- A multi-tool (like a Swiss Army knife).
- A folding saw.
- 3-8'x6" tarps plus one 12 X 16" tarp or larger (or a tent).
- 100 " of utility cord or parachute cord.
- A small pot.
- A small stove (a small folding military stoves with trioxethelyne tablets will work well).
- Closed cell foam pads or several square feet of double-wall bubble insulation (the silver sided bubble wrap used in construction) to use as a sleeping pad or for hypothermia treatment.
- Emergency Food.
- Water.
- Sleeping bag with a mylar® bivouac (bivy) sack to be used as a vapor barrier inside.

3.0 Drinking Water

3.1 No surface water can be considered safe for human consumption without treatment. Even the cleanest looking spring water could be polluted. Untreated water may be contaminated with bacteria, viruses, or protozoa.

3.2 On short trips, carry treated water or obtain water from another safe source.

3.3 When field projects take you into remote isolation where there is the potential for not having access to clean drinking water, be sure to take the appropriate tools with you: a water filter, tin foil or a pot for boiling water, or tablets or chemicals for treating the water prior to consumption.

3.4 Generally, the chances of finding safe drinking water in the mountains increase as you gain altitude. Intense sunlight at high altitudes kills undesirable bacteria and viruses but harmful cysts are unaffected.

3.5 Runoff water from streams below glaciers is often cloudy with silt and should be filtered.

3.6 Well water and moving rivers are the best locations to obtain water. Avoid stagnant water, shoreline water, and water close to human habitations and campsites.

3.7 During the winter, it is best to use an open water source or to obtain water through a hole in the ice. Check the safety of the ice first. Melting ice and snow consumes fuel and takes extra time. Eating snow or ice directly can lead to chilling and hypothermia and could also cause stomach cramps and headaches. Beware of colored snow, which indicates the presence of algae that could cause diarrhea if ingested. Even in winter, all water should be purified.

3.8 Water Treatment

3.8.1 Each method of water treatment has its advantages and disadvantages. Use only boiled or treated (filtered and disinfected) water for drinking, brushing teeth, or washing fruits and vegetables that will be eaten raw. Heat is the oldest, safest and most effective method of purifying water. However when boiling is not practical because of time and lack of a heat source, water should be treated by filtration and disinfection .This method may not be as effective as boiling the water.

3.8.2 Use two water containers: one for treating water and the other for carrying purified water. After disinfection, shake the container vigorously. Wait five minutes. Shake it again with the lid loose so that some water leaks out to cleanse the mouth of the container. Then pour the water into a clean container for drinking water.

3.8.3 Boiling. Bring the water to a boil for at least one minute (adding one more minute for each 300 m (1000 ft.) above sea level. If the water is cloudy, filter it before boiling.

3.8.4 Filtration. Water filters for use in the wilderness are available. Avoid filters that allow particles larger than 0.5 microns to pass. Filters with a pore size of 0.1 to 0.3 micron can remove protozoa and some bacteria but may not remove viruses. Filtration alone is insufficient to purify water; hence, it should be combined with disinfection to kill viruses and bacteria.

3.8.5 Disinfection. Disinfect with chlorine or iodine compounds, following the manufacturers instructions. Disinfection alone may not kill some protozoa..

Table 1: Summary of Water Purification Methods

	Boiling	Chlorine	Iodine	Filters
Bacteria	E	E	E	M
Viruses	E	E	E	N
Protozoa	E	M	M	M
Chemicals	M	N	N	N

E = effective M = may be effective (see text) N = not effective

3.8.6 Additional portable water purification devices are available, using methods such as ozone disinfection, ultraviolet purification, or solar water disinfection.

3.8.7 Water treatment methods should be evaluated for suitability to the work environment, the potential water hazards, and limitation of the device.

3.8.8 Some water-borne diseases are difficult to diagnose. If you are not feeling well and have recently drunk water from a source in the wild, inform your doctor that you may have consumed untreated water.

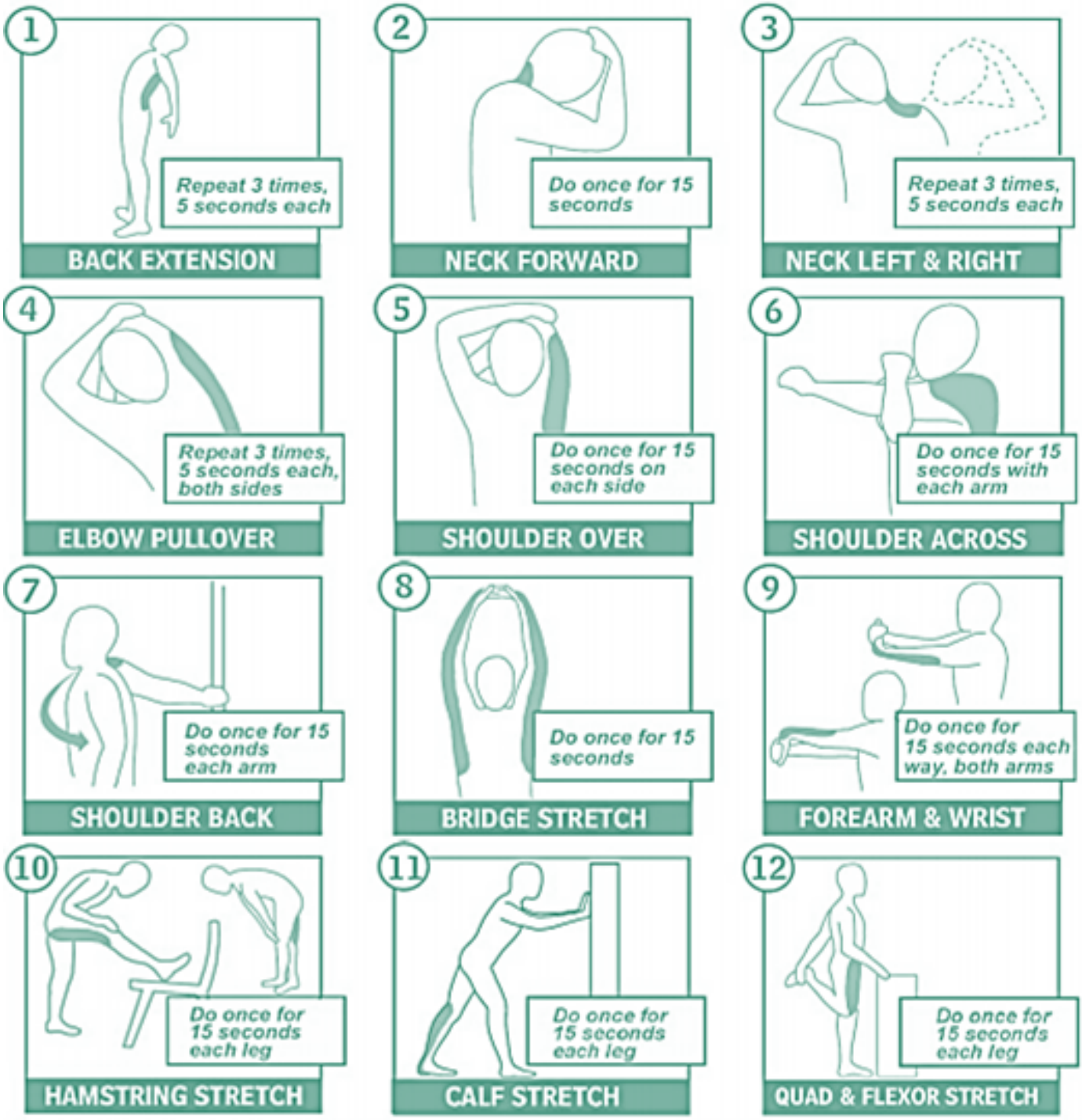
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Attachment C

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

NYSDOH Generic Community Air Monitoring Plan

Attachment E: NYSDOH Generic Community Air Monitoring Plan

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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.

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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:

- 1,2-Dichloroethane
- Cis-1,2-Dichloroethlyene
- Trichloroethylene (TCE)
- Vinyl Chloride
- Alconox
- Bentonite
- Helium
- Hydrochloric Acid
- Isobutylene

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.

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.

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- 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.
- 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.

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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

SAFETY DATA SHEET

Version 6.17
Revision Date 07/29/2025
Print Date 07/30/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : 1,2-Dichloroethane

Product Number : 284505
Brand : Sigma-Aldrich
Index-No. : 602-012-00-7
CAS-No. : 107-06-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis 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 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)

Flammable liquids : Category 2

Acute toxicity (Oral) : Category 4

Acute toxicity (Inhalation) : Category 3

Skin irritation : Category 2

Eye irritation : Category 2A

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Carcinogenicity	:	Category 1B
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system)
Aspiration hazard	:	Category 1

Other hazards

None known.

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements :
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
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, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P261 Avoid breathing mist or vapours.
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 and face protection.

Response:

P301 + P310 IF SWALLOWED: Immediately call a

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POISON CENTER/ doctor.
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.
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.
P331 Do NOT induce vomiting.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ 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.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
1,2-Dichloroethane	107-06-2*	>= 80 - <= 100	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

General advice : First aiders need to protect themselves.
Show this safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air. Immediately call in physician.

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		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	:	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
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIREFIGHTING 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. Vapours are heavier than air and may spread along floors. Development of hazardous combustion gases or vapours possible in the event of fire.

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		Forms explosive mixtures with air at ambient temperatures.
Hazardous combustion products	:	Carbon oxides Hydrogen chloride gas
Specific extinguishing methods	:	No data available
Further information	:	Remove container from danger zone and cool with water. Suppress (knock down) gases/vapours/mists with a water spray jet. 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, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Do not breathe vapours, 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

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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 authorised persons.
Storage class	:	3, Flammable liquids
Recommended storage temperature	:	Recommended storage temperature see product label.
Packaging material	:	Suitable material: Mild Steel Drum

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
1,2-Dichloroethane	107-06-2	TWA	10 ppm	ACGIH
		ST	2 ppm 8 mg/m3	NIOSH REL
		TWA	1 ppm 4 mg/m3	NIOSH REL
		TWA	50 ppm	OSHA Z-2
		CEIL	100 ppm	OSHA Z-2
		Peak	200 ppm (5 mins. in any 3 hrs.)	OSHA Z-2

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.

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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	:	Viton®
Break through time	:	480 min
Glove thickness	:	0.7 mm
Protective index	:	Full contact
Manufacturer	:	Vitoject® (KCL 890 / Aldrich Z677698, Size M)
Material	:	Chloroprene
Break through time	:	10 min
Glove thickness	:	0.65 mm
Protective index	:	Splash contact
Manufacturer	:	KCL 720 Camapren®
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	:	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	:	viscous liquid
Color	:	colourless

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Odor	:	of solvents
Odor Threshold	:	3 ppm
pH	:	No data available
Melting point/ range	:	-31 °F / -35 °C Method: lit.
Boiling point/boiling range	:	181 °F / 83 °C Method: lit.
Flash point	:	ca. 55 °F / 13 °C (1,013 hPa) Method: DIN 51755 Part 1, closed cup
Evaporation rate	:	4.1
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Self-ignition	:	824 °F / 440 °C 1,013 hPa Method: DIN 51794
Upper explosion limit / Upper flammability limit	:	Upper explosion limit 15.9 %(V)
Lower explosion limit / Lower flammability limit	:	Lower explosion limit 6 %(V)
Vapor pressure	:	87 hPa (68 °F / 20 °C) 102 hPa (77 °F / 25 °C)
Relative vapour density	:	4.1 (68 °F / 20 °C)
Relative density	:	No data available
Density	:	1.256 g/mL (77 °F / 25 °C) Method: lit.
Solubility(ies) Water solubility	:	7.9 g/l soluble (77 °F / 25 °C) pH: 7.4 Method: OECD Test Guideline 105
Partition coefficient: n-	:	log Pow: 1.45 (68 °F / 20 °C)

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octanol/water		pH: 7.4 Method: OECD Test Guideline 107 Bioaccumulation is not expected.
Autoignition temperature	:	824 °F / 440 °C (1,013 hPa) Method: DIN 51794
Decomposition temperature	:	572 °F / 300 °C
Viscosity		
Viscosity, dynamic	:	0.83 mPa.s (68 °F / 20 °C)
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	none
Surface tension	:	32.45 mN/m, 68 °F / 20 °C
Molecular weight	:	98.96 g/mol
Particle characteristics		
Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapours may form explosive mixture with air.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Exothermic reaction with: Alkaline earth metals alkali amides Nitric acid nitrogen oxides Oxidizing agents Chlorine powdered magnesium Zinc Risk of explosion with: Alkali metals powdered aluminium Powdered metals Potassium nitrogen dioxide

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Conditions to avoid	:	Warming.
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 - male - 770 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male and female - 4 h - 7.8 mg/l - vapour

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - male - 4,890 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: irritating
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
(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: S. typhimurium
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (ECHA)
Test Type: Ames test
Test system: Escherichia coli
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 471
Result: positive
Test Type: In vitro mammalian cell gene mutation test
Test system: human lymphoblastoid cells
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: positive
Test Type: In vitro mammalian cell gene mutation test
Test system: human lymphoblastoid cells
Metabolic activation: without metabolic activation

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Result: positive
Remarks: (ECHA)
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (ECHA)
Test Type: unscheduled DNA synthesis assay
Test system: rat hepatocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 482
Result: positive

Test Type: Micronucleus test
Species: Mouse

Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative

Test Type: Mutagenicity (mammal cell test): micronucleus.
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Test Type: sister chromatid exchange assay
Species: Rat
Cell type: mammary gland
Application Route: inhalation (vapour)

Result: negative
Remarks: (ECHA)

Species: Drosophila melanogaster
Cell type: sperm
Application Route: Inhalation
Method: OECD Test Guideline 477
Result: positive

Test Type: Transgenic rodent somatic cell gene mutation assay
Species: Mouse

Application Route: Intraperitoneal

Result: negative
Remarks: (ECHA)

Carcinogenicity
Presumed to have carcinogenic potential for humans

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IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,2-Dichloroethane)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (1,2-Dichloroethane)

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.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
Aspiration may cause pulmonary oedema and pneumonitis.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 d - No observed adverse effect level - 37.5 mg/kg
Remarks: Subchronic toxicity

Repeated dose toxicity - Mouse - male and female - Inhalation - 104 Weeks

RTECS: KI0525000
Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include:, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Pancreas. -

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

1,2-Dichloroethane:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 136 mg/l End point: mortality Exposure time: 96 h Test Type: flow-through test Analytical monitoring: yes

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Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 160 mg/l End point: Immobilization Exposure time: 48 h Test Type: static test Analytical monitoring: yes Remarks: (in soft water) (IUCLID)
Toxicity to algae/aquatic plants	:	EC50 (Desmodesmus subspicatus (green algae)): 166 mg/l Exposure time: 72 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 11 mg/l End point: reproduction rate Exposure time: 28 d Test Type: static test Analytical monitoring: yes Remarks: (ECHA)
Toxicity to microorganisms	:	EC50 (activated sludge): 35,500 mg/l Exposure time: 3 h Test Type: static test Method: OECD Test Guideline 209

Persistence and degradability

Components:

1,2-Dichloroethane:

Biodegradability	:	aerobic Concentration: 0.25 mg/l Result: Inherently biodegradable. Biodegradation: > 90 % Exposure time: 20 d Remarks: (ECHA)

Bioaccumulative potential

Components:

1,2-Dichloroethane:

Bioaccumulation	:	Species: Lepomis macrochirus Bioconcentration factor (BCF): 2 Exposure time: 14 d Temperature: 61 °F / 16 °C Concentration: 0.957 mg/l

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Partition coefficient: n-octanol/water	:	log Pow: 1.45 (68 °F / 20 °C) pH: 7.4 Method: OECD Test Guideline 107 Remarks: Bioaccumulation is not expected.

Mobility in soil

Components:

1,2-Dichloroethane:

Distribution among environmental compartments	:	Adsorption/Soil Koc: 38, log Koc: 1.58 Method: (experimental) Remarks: Mobile in soils Remarks: (Lit.)

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.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1184
Proper shipping name	:	Ethylene dichloride
Class	:	3
Subsidiary risk	:	6.1
Packing group	:	II
Labels	:	Class 3 - Flammable liquids, Division 6.1 - Toxic substances
Packing instruction (cargo	:	364

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aircraft)
Packing instruction (passenger aircraft) : 352

IMDG-Code

UN number : UN 1184
Proper shipping name : ETHYLENE DICHLORIDE

Class : 3
Subsidiary risk : 6.1
Packing group : II
Labels : 3 (6.1)
EmS Code : F-E, S-D
Marine pollutant : no

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National Regulations

49 CFR Road

UN/ID/NA number : UN 1184
Proper shipping name : Ethylene dichloride

Class : 3
Subsidiary risk : 6.1
Packing group : II
Labels : Class 3 - Flammable liquids, Division 6.1 - Toxic substances
ERG Code : 131
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)
1,2-Dichloroethane	107-06-2	100	100
1,2-Dichloroethane	107-06-2	100	100 (D028)

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.

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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:

1,2-Dichloroethane	107-06-2	>= 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):

1,2-Dichloroethane	107-06-2	>= 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).
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):

1,2-Dichloroethane	107-06-2	>= 90 - <= 100 %

Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

1,2-Dichloroethane	107-06-2	>= 90 - <= 100 %

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

1,2-Dichloroethane	107-06-2	>= 90 - <= 100 %

This product contains the following toxic pollutants listed under the U.S. Clean Water Act Section 307

1,2-Dichloroethane	107-06-2	>= 90 - <= 100 %

This product contains the following priority pollutants related to the U.S. Clean Water Act:

1,2-Dichloroethane	107-06-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

1,2-Dichloroethane	107-06-2

Pennsylvania Right To Know

1,2-Dichloroethane	107-06-2

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

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California Prop. 65

WARNING: This product can expose you to chemicals including 1,2-Dichloroethane, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

International Regulations

Rotterdam Convention (Prior Informed Consent) : 1,2-Dichloroethane

The components 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:
1,2-Dichloroethane 107-06-2

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-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
ACGIH / TWA	:	8-hour, time-weighted average
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
OSHA Z-2 / TWA	:	8-hour time weighted average
OSHA Z-2 / CEIL	:	Acceptable ceiling concentration
OSHA Z-2 / Peak	:	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift

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 Harmonised 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 -

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International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; 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 - Organisation 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 : 07/29/2025

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US / EN

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SAFETY DATA SHEET

Version 6.12
Revision Date 01/02/2025
Print Date 01/03/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : *cis*-1,2-Dichloroethene

Product Number : 48597
Brand : Supelco
Index-No. : 602-026-00-3
CAS-No. : 156-59-2

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

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids : Category 2

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Acute toxicity (Oral)	:	Category 4
Acute toxicity (Inhalation)	:	Category 4
Skin irritation	:	Category 2
Short-term (acute) aquatic hazard	:	Category 3
Long-term (chronic) aquatic hazard	:	Category 3

GHS label elements

Hazard pictograms :



Signal Word : Danger

Hazard Statements :
H225 Highly flammable liquid and vapor.
H302 + H332 Harmful if swallowed or if inhaled.
H315 Causes skin irritation.
H412 Harmful to aquatic life with long lasting effects.

Precautionary Statements :

Prevention:

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.
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/ eye protection/ face protection.

Response:

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
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

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fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
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.

Storage:

P403 + P235 Store in a well-ventilated place. Keep cool.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS-No.	Concentration (% w/w)
cis-Dichloroethylene	156-59-2	>= 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. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

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: 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

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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 Hydrogen chloride gas
Specific extinguishing methods	:	No data available
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.

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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, 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 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.
Storage class	:	3, Flammable liquids
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
cis-Dichloroethylene	156-59-2	TWA	200 ppm	ACGIH

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 type AX

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

Remarks : required

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

Color : light yellow

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Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point/ range	:	-112 °F / -80 °C Method: lit.
Boiling point/boiling range	:	140 °F / 60 °C Method: lit.
Flash point	:	42.8 °F / 6.0 °C Method: closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available
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	:	1.284 g/cm3 (77 °F / 25 °C) Method: lit.
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

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Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	none
Molecular weight	:	96.94 g/mol
Particle characteristics Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapors may form explosive mixture with air.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Violent reactions possible with: Oxidizing agents
Conditions to avoid	:	Warming.
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 - 770 mg/kg
Remarks: (RTECS)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l - vapor

(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Moderate skin irritation - 24 h
Remarks: (RTECS)

Serious eye damage/eye irritation
No data available

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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: KV9420000
narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

cis-Dichloroethylene:

Toxicity to fish	:	LC50 (Lepomis macrochirus (Bluegill sunfish)): 140 mg/l Exposure time: 96 h Remarks: (ECOTOX Database)

Ecotoxicology Assessment

Acute aquatic toxicity	:	Harmful to aquatic life.
Chronic aquatic toxicity	:	Harmful to aquatic life with long lasting effects.

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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.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1150
Proper shipping name	:	1,2-Dichloroethylene
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 1150
Proper shipping name	:	1,2-DICHLOROETHYLENE
Class	:	3
Packing group	:	II
Labels	:	3
EmS Code	:	F-E, S-D

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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 1150
Proper shipping name : 1,2-Dichloroethylene

Class : 3
Packing group : II
Labels : Class 3 - Flammable liquids
ERG Code : 130P
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.

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

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).

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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

cis-Dichloroethylene	156-59-2	>= 90 - <= 100 %

This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

cis-Dichloroethylene	156-59-2

Pennsylvania Right To Know

cis-Dichloroethylene	156-59-2

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.

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 / 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

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- 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 : 01/02/2025

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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.

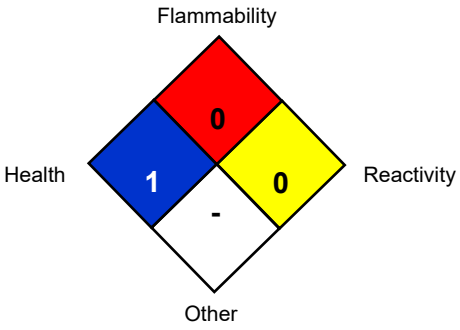
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

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 6.8
Revision Date 06/26/2025
Print Date 06/27/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Nanoclay, hydrophilic bentonite

Product Number : 682659
Brand : Aldrich
CAS-No. : 1302-78-9

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

No hazard pictogram, no signal word, no hazard statement(s), no precautionary statement(s) required.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture	:	Substance

Components

No hazardous ingredients

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. FIREFIGHTING 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. Development of hazardous combustion gases or vapours possible in the event of fire.

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Hazardous combustion products	:	Aluminum oxide silicon oxides
Specific extinguishing methods	:	No data available
Further information	:	Suppress (knock down) gases/vapours/mists with a water spray jet. 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	:	11, Combustible Solids
Recommended storage temperature	:	Recommended storage temperature see product label.

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Packaging material	:	Suitable material: LDPE Bottle/Jar

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.

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 use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves

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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 CE 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	:	solid
Color	:	No data available
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Boiling point/boiling range	:	No data available
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available

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Vapor pressure	:	No data available
Relative vapour 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
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) .
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
LD50 Oral - Rat - > 5,000 mg/kg
Remarks: (IUCLID)
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
Test Type: Ames test
Test system: Salmonella typhimurium
Result: negative
Remarks: (Lit.)

Carcinogenicity

IARC: No component 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 component 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: CT9450000
Lung irritation, Asthma

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

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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.

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 Regulations

49 CFR Road
Not regulated as a dangerous good

Poison Inhalation Hazard	:	No

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Special precautions for user

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 : 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.

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

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Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The components 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

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

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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 : 06/26/2025

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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SAFETY DATA SHEET

Helium

Section 1. Identification

GHS product identifier : Helium

Chemical name : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

SDS # : 001025

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

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

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 : Not applicable.

Response : Not applicable.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

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 : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

Product code : 001025

CAS number/other identifiers

CAS number : 7440-59-7

Ingredient name	%	CAS number
Helium	100	7440-59-7

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 : 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. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. 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. Get medical attention if adverse health effects persist or are severe. 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 : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. 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

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : 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 : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

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 : No specific data.

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. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized 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. Avoid breathing gas. 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.

Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous.

Section 7. Handling and storage

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). 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). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Helium	**ACGIH TLV (United States, 3/2019). Oxygen Depletion [Asphyxiant].**

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

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: safety glasses with side-shields.

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.

Section 8. Exposure controls/personal protection

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. 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. [Compressed gas.]

Color : Colorless.

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Melting point : -272.2°C (-458°F)

Boiling point : -268.9°C (-452°F)

Critical temperature : -267.9°C (-450.2°F)

Flash point : [Product does not sustain combustion.]

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : 0.14 (Air = 1) Liquid Density@BP: 7.8 lb/ft3 (125 kg/m3)

Specific Volume (ft ^{3}/lb) : 96.1538

Gas Density (lb/ft ^{3}) : 0.0104

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : 0.28

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 4 g/mole

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.

Section 10. Stability and reactivity

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

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 : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : 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 : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Section 11. Toxicological information

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.

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

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Helium	0.28	-	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

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1046	UN1046	UN1046	UN1046	UN1046
UN proper shipping name	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: 75 kg. Cargo aircraft: 150 kg.

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
Passenger Carrying Road or Rail Index 75

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 75 kg. Cargo Aircraft Only: 150 kg.

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 IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

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) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

Section 15. Regulatory information

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

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 : **Japan inventory (ENCS)**: Not determined.
Japan inventory (ISHL): Not determined.

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.

Thailand : Not determined.

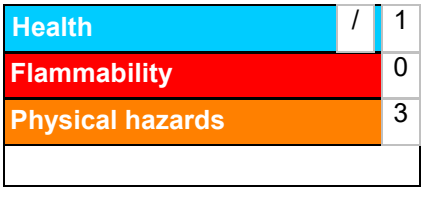
Turkey : Not determined.

United States : This material is active or exempted.

Viet Nam : This material is listed or exempted.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Section 16. Other information

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 and the associated label are not required on SDSs or products leaving a facility 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 trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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
GASES UNDER PRESSURE - Compressed gas	Expert judgment

History

Date of printing : 1/27/2021

Date of issue/Date of revision : 1/27/2021

Date of previous issue : 4/23/2018

Version : 1.02

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 = 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.

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

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

This information is drawn from recognized sources believed to be reliable. ASHTA Chemicals, Inc. Makes no guarantees or assumes any liability in connection with this information. The user should be aware of changing technology, research, regulations, and analytical procedures that may require changes herein. The above data is supplied upon the condition that persons will evaluate this information and then determine its suitability for their use. Only U.S.A regulations apply to the above.

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

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

SDS # : 001031

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 : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

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. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

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 : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product code : 001031

CAS number/other identifiers

CAS number : 115-11-7

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

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 : 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. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. 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. Get medical attention if adverse health effects persist or are severe. 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 : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. 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

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

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 : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

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. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

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. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

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 : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized 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. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. 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. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. 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.

Use only non-sparking tools. Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

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). Eliminate all ignition sources. 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). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2017).** TWA: 250 ppm 8 hours.

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. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

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: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal 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. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

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 : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. 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. [Compressed gas.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -140.7°C (-221.3°F)

Boiling point : -6.9°C (19.6°F)

Critical temperature : 144.75°C (292.6°F)

Flash point : Closed cup: -76.1°C (-105°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.26 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 56.12 g/mole

Aerosol product

Heat of combustion : -45029034 J/kg

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 : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

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
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

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 : No known significant effects or critical hazards.

Section 11. Toxicological information

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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.

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

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 12. Ecological information

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

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 19, T50

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden
Special provisions 29

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

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 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act (CAA) 112 regulated flammable substances: Isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

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) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

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 : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): Not determined.

Malaysia : Not determined.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Section 15. Regulatory information

Taiwan : This material is listed or exempted.

Thailand : Not determined.

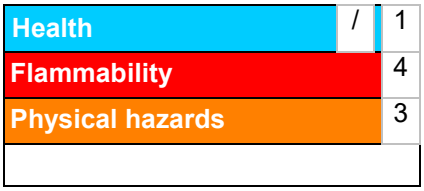
Turkey : Not determined.

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

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 and the associated label are not required on SDSs or products leaving a facility 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 trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

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
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas	Expert judgment Expert judgment

History

Date of printing : 5/10/2018

Date of issue/Date of revision : 5/10/2018

Date of previous issue : 7/11/2016

Version : 0.02

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 = International Convention for the Prevention of Pollution From Ships, 1973

Section 16. Other information

as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

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

Creation Date 03-Feb-2010 **Revision Date** 24-Dec-2021 **Revision Number** 3

1. Identification

Product Name **Trichloroethylene**

Cat No. : **T340-4; T341-4; T341-20; T341-500; T403-4**

CAS No 79-01-6
Synonyms Trichloroethene (Stabilized/Technical/Electronic/Certified ACS)

Recommended Use Laboratory chemicals.
Uses advised against .

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

Label Elements

Signal Word

Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
Suspected of causing genetic defects
May cause cancer
May cause damage to organs through prolonged or repeated exposure



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
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
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
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
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
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)
Harmful to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Trichloroethylene	79-01-6	>95

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact	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 allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: 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

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	410 °C / 770 °F
Explosion Limits	
Upper	44.8 vol %
Lower	8 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Chlorine. Phosgene. Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrogen chloride gas.

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
2	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from light. Do not store in aluminum containers. Incompatible Materials. Strong oxidizing agents. Strong bases. Amines. Alkali metals. Metals. .

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Trichloroethylene	TWA: 10 ppm STEL: 25 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 270 mg/m³ Ceiling: 200 ppm (Vacated) STEL: 200 ppm (Vacated) STEL: 1080 mg/m³ TWA: 100 ppm	IDLH: 1000 ppm	TWA: 10 ppm STEL: 25 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-85 °C / -121 °F
Boiling Point/Range	87 °C / 188.6 °F
Flash Point	No information available
Evaporation Rate	0.69 (Carbon Tetrachloride = 1.0)

Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	44.8 vol %
Lower	8 vol %
Vapor Pressure	77.3 mbar @ 20 °C
Vapor Density	4.5 (Air = 1.0)
Specific Gravity	1.460
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	410 °C / 770 °F
Decomposition Temperature	> 120°C
Viscosity	0.55 mPa.s (25°C)
Molecular Formula	C2 H Cl3
Molecular Weight	131.39

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Light sensitive.

Conditions to Avoid Incompatible products. Excess heat. Exposure to light. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong bases, Amines, Alkali metals, Metals,

Hazardous Decomposition Products Chlorine, Phosgene, Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas

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
Trichloroethylene	LD50 = 4920 mg/kg (Rat)	LD50 = 29000 mg/kg (Rabbit)	LC50 = 26 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Trichloroethylene	79-01-6	Group 1	Known	A2	X	A2

IARC (International Agency for Research on Cancer)
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)
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
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Mutagenic effects have occurred in humans.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: 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

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. The product contains following substances which are hazardous for the environment. Contains a substance which is:. Harmful to aquatic organisms. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Trichloroethylene	EC50: = 175 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 450 mg/L, 96h (Desmodesmus subspicatus)	LC50: 31.4 - 71.8 mg/L, 96h flow-through (Pimephales promelas) LC50: 39 - 54 mg/L, 96h static (Lepomis macrochirus)	EC50 = 0.81 mg/L 24 h EC50 = 115 mg/L 10 min EC50 = 190 mg/L 15 min EC50 = 235 mg/L 24 h EC50 = 410 mg/L 24 h EC50 = 975 mg/L 5 min	EC50: = 2.2 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Trichloroethylene	2.4

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.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Trichloroethylene - 79-01-6	U228	-

14. Transport information

DOT

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1

Packing Group III

TDG

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Trichloroethylene	79-01-6	X	ACTIVE	R;S

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

TSCA 12(b) - Notices of Export

Component	CAS No	**TSCA 12(b)** - Notices of Export
Trichloroethylene	79-01-6	Section 5 Section 6

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
Trichloroethylene	79-01-6	X	-	201-167-4	X	X	X	X	X	X

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Trichloroethylene	79-01-6	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Trichloroethylene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors

Trichloroethylene	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA: This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Trichloroethylene	100 lb 1 lb	-

California Proposition 65: This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Trichloroethylene	79-01-6	Carcinogen Developmental Male Reproductive	14 µg/day 50 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trichloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
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	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)
Trichloroethylene	Carcinogenic Category 1B Article 57 Application date: October 21, 2014 Sunset date: April 21, 2016 Exemption - None	Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 201-167-4 - Carcinogenic, Article 57a

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

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)
Trichloroethylene	79-01-6	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive	Seveso III Directive	Rotterdam	Basel Convention

		(2012/18/EC) - Qualifying Quantities for Major Accident Notification	(2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Convention (PIC)	(Hazardous Waste)
Trichloroethylene	79-01-6	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 03-Feb-2010
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

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 8.8
Revision Date 08/23/2023
Print Date 08/10/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Vinyl chloride

Product Number : 387622
Brand : Aldrich
Index-No. : 602-023-00-7
CAS-No. : 75-01-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis 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

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Carcinogenicity (Category 1A), H350

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

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Hazard statement(s)

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.

Precautionary statement(s)

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.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Chloroethylene

Formula : C_2H_3Cl
Molecular weight : 62.50 g/mol
CAS-No. : 75-01-4
EC-No. : 200-831-0
Index-No. : 602-023-00-7

Component	Classification	Concentration
Vinyl chloride		
	Flam. Gas 1; Press. Gas Liquefied gas; Carc. 1A; H220, H280, H350	<= 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. 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
Hydrogen chloride gas
Combustible.
Pay attention to flashback.
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
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: Do not breathe gas. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

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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). Stop flow of gas, move leaking cylinder to open air if without risk.

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.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.

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 locked up or in an area accessible only to qualified or authorized persons. Keep away from combustible materials and sources of ignition.

Contents under pressure. Light sensitive.

Storage class
Storage class (TRGS 510): 2A: Gases

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
Vinyl chloride	75-01-4	TWA	1 ppm	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Lung cancer Confirmed human carcinogen		

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		STEL	5 ppm	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		See 1910.1017		
		Potential Occupational Carcinogen See Appendix A		

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
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/mists 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: Liquefied gas Color: colorless
b)	Odor	odorless
c)	Odor Threshold	Not applicable
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -153.8 °C (-244.8 °F) - lit.

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f)	Initial boiling point and boiling range	-13.4 °C 7.9 °F - lit.
g)	Flash point	-62 °C (-80 °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: 29.3 %(V) Lower explosion limit: 3.8 %(V)
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	0.911 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	9.15 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.58 at 22 °C (72 °F) - Bioaccumulation is not expected.
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	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
Violent reactions possible with:
Strong oxidizing agents

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
LC50 Inhalation - Rat - 2 h - 390 mg/l - gas

Remarks: (ECHA)
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
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Metabolic activation: without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Test Type: dominant lethal test
Species: Mouse

Application Route: inhalation (gas)

Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Mouse

Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: positive

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

IARC: 1 - Group 1: Carcinogenic to humans (Vinyl chloride)

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NTP: Known - Known to be human carcinogen (Vinyl chloride)

OSHA: OSHA specifically regulated carcinogen (Vinyl chloride)

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) - 30 mg/kg

RTECS: KU9625000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Danio rerio (zebra fish) - 210 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to bacteria	Remarks: (ECHA) (Vinyl chloride)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 16 % - Not readily biodegradable. (OECD Test Guideline 301D)

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. Pressurised gas bottle: dispose of only in empty condition! See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1086 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: VINYL CHLORIDE, STABILIZED

IATA
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D043 lbs

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Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01
hydroquinone	123-31-9	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.Vinyl chloride	75-01-4	2007-09-28

SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. 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: 8.8 Revision Date: 08/23/2023 Print Date: 08/10/2024

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Appendix B (of the SCWP) – FAP

Field Activities Plan

6 Old River Road, Glenmont, NY (Site No. 401088)

New York State Department of Environmental Conservation
Standby Contract No. D009803 - Work Assignment 60

Project number: 60770465

February 2026

Prepared for:

New York State Department of Environmental Conservation, Region 4
1130 North Westcott Road
Schenectady, NY 12306

Prepared by:

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Table 2 Monitoring Well Sampling Plan

Appendices

Appendix A (of the FAP) NYSDEC PFAS Sampling and Analysis Guidance
Appendix B (of the FAP) Field Activities Form
Appendix C (of the FAP) Vapor Pin Procedures
Appendix D (of the FAP) NYSDOH Indoor Air Quality Questionnaire and Building Inventory

1. Introduction

AECOM USA, Inc. (AECOM) has prepared this Field Activities Plan (FAP) for Site No. 401088 located at 6 Old River Road, Glenmont, Albany County, New York (**Figure 1**). This work was performed for the New York State Department of Environmental Conservation (NYSDEC) under Contract D009803 Work Assignment 60.

The data gathering effort outlined in this FAP includes inspection of an on-site water supply well, advancement of boreholes, analysis of subsurface soil samples, installation of overburden monitoring wells, the analysis of groundwater samples from newly installed wells and the on-site supply well, as well as sub-slab soil vapor and ambient air sampling. This information will be necessary to further assess subsurface impacts, evaluate potential for soil vapor intrusion in the existing on-site building, provide recent data related to Site conditions and determine a source area of the detected chlorinated volatile organic compounds. All data collected will be compiled into a Site Characterization Investigation Report in response to the request from NYSDEC for this Site Characterization Investigation.

This FAP is designed to provide typical procedures for the field activities on work assignments (WAs) issued under NYSDEC Contract D009803. It will serve as the field procedures manual for all AECOM personnel. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/ Quality Control (QA/QC) measures outlined in the Quality Assurance Project Plan (QAPP); (2) the appropriate Health and Safety guidelines found in the Health and Safety Plan (HASP); (3) the scope of work outlined in the WAs; and (4) the time schedule outlined in the WAs.

1.1 Work Assignment Objectives

The objectives of the work assignment will be established in the WAs issued by NYSDEC under contract D009803-60 and documented in the Scope of Work (SOW); refer to Appendix A. The general objectives of the current WA are to characterize vertical and lateral extents of the detected contaminants at the Site, obtain recent data on contaminant concentrations at the Site and compile the information into a Site Characterization Report.

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

The FAP is intended to be a companion document to the site-specific Work Plan prepared for each work assignment. This site-specific FAP has been prepared using the NYSDEC Generic FAP as a guideline and is included as an Appendix to the site-specific Work Plan for this WA to address site-specific conditions and project-specific requirements.

The scope of work to be completed on site consists of:

1. Geophysical utility location services and soil boring/sub-slab vapor point clearance will be performed by an AECOM subcontractor.
2. Soil borings will be advanced by an AECOM subcontractor down to an estimated depth of approximately twenty-five (25) feet below ground surface (bgs) or to refusal if shallower. All locations will be hand cleared to five feet bgs. Borings will be advanced using 4¼-inch internal diameter (I.D.) hollow stem augers (HSAs). Split spoon samples will be collected continuously using standard penetration techniques (ASTM D1586-84) from the ground surface to

approximately 25 feet bgs or to depth of bedrock. All soil samples will be visually described and classified, inspected for signs of contamination, and screened with a photoionization detector (PID) for the presence of organic vapors by the supervising AECOM geologist. Samples will be collected from split spoons for off-site laboratory chemical analysis.

3. One soil sample will be collected from each of the four soil boring locations for a total of four soil samples. The soil samples will be biased toward the depth with the highest PID reading or immediately above the water table. Soil samples will be analyzed for the following parameters (via a NYSDEC call-out laboratory):
    a. Total Compound List (TCL) Volatile Organic Compounds (VOCs) by EPA Method 8260D;
    b. TCL Semi-volatile Organic Compounds (SVOCs) (including 1,4-dioxane) by EPA Method 8270D/8270 SIM;
    c. Target Analyte List (TAL) Metals by EPA Method 6010C;
    d. Mercury by EPA Method 7471A;
    e. Cyanide by EPA Method 9010;
    f. TCL Polychlorinated Biphenyls (PCBs) by EPA Method 8082;
    g. TCL Herbicides/Pesticides by EPA Methods 8151A/8081; and,
    h. Per- and polyfluoroalkyl substances (PFAS) by EPA Method 1633A.
4. All four soil borings will be converted to monitoring wells. The monitoring wells will be constructed with 10-feet of 2-inch ID #10 slot PVC screen (straddling the water table) attached to a 2-inch ID, Schedule 40 PVC riser to the ground surface and a 1-foot sump Schedule 40 PVC at the bottom. If bedrock is encountered below the water table, but prior to 25 feet bgs, drilling will cease, and the well shall be screened at a depth that straddles the water table above the bedrock interface, as directed by the AECOM geologist. A #2 size sand pack will be installed from the bottom of the well screen up to 2 feet above the top of each of the well screens. A minimum 2-feet thick bentonite seal will be installed above the sand pack, hydrated and allowed to sit for 30 minutes prior to the placement of the cement/bentonite grout (neat cement). The grout will be placed from above the bentonite seal to an elevation of 1-foot below grade via a tremie pipe. Each well shall be completed with a flush mount curb box. Each well shall be equipped with a locking expandable plug (J-plug) and lock.
5. Each new well will be developed by pumping until the discharged water is relatively sediment free (<10 NTU if possible) and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state.
6. Prior to collecting groundwater samples, a comprehensive round of water levels will be collected from the new monitoring wells.
7. Groundwater samples will be collected from the newly installed monitoring wells and from the existing onsite drinking water well using low-flow sampling procedures. Two rounds of groundwater sampling will be performed. The first round of groundwater samples will be analyzed as summarized below:
    a. TCL VOCs by EPA Method 8260D;
    b. TCL SVOCs including 1,4-dioxane by EPA Method 8270D/8270 SIM;
    c. TAL Metals by EPA Method 6010C;
    d. Mercury by EPA Method 7470A;
    e. Cyanide by EPA Method 9010;
    f. TCL PCBs by EPA Method 8082A;

g. TCL Herbicides/Pesticides by EPA Methods 8151A/8081B; and,

h. PFAS by EPA Method 1633A.

i. The second round of groundwater sampling will be performed approximately 90 days after the initial round, with samples anticipated to be analyzed only for TCL VOCs by EPA Method 8260D.

8. All soil spoils, decontamination fluids, well development and purge water will be drummed for off-site disposal. The drums will be staged in a secure location on-site until transport and disposal are arranged.

9. One solid and one aqueous sample will be collected for disposal parameters as required by the disposal facility to complete the waste profiles for the IDW transportation and off-site disposal.

10. Four sub-slab soil vapor pin sampling points, with four concurrent indoor ambient air samples will be collected from inside the existing building. In addition, one indoor air sample will be collected from the office area above the crawl space within the building, while one outdoor air sample will be collected to establish background conditions. Air sample locations have been determined in coordination with NYSDEC and NYSDOH during the onsite meeting held on October 7, 2025. A total of 10 soil vapor and air samples will be collected to be analyzed by EPA method TO-15. The installation of sub-slab vapor pins will be performed by AECOM using handheld drill with a 1-inch coring bit. Each vapor pin will be sealed and tested for integrity using the helium shroud testing method. Vapor samples, including sub-slab, indoor air, and outdoor air, will be collected using 6-liter Summa® canisters over a 24-hour period at a flow rate of 3.2–3.4 mL/min. Indoor air samples will be co-located with sub-slab points and collected three feet above the floor, while the outdoor air sample will be placed five feet above the ground in a secure, upwind location, with adjustments discussed with NYSDEC/NYSDOH if needed. A blind field duplicate will be collected at a rate of 1 per 20 samples, and all canisters will be sealed and shipped to a certified laboratory with verified-clean certifications for analysis. AECOM will maintain a sample and photo log for each location to ensure proper documentation and compliance with NYSDOH and NYSDEC guidelines.

11. The laboratory analyses will be performed by a NYSDEC call-out laboratory. The proposed sampling program is presented in Table 1 below.

12. A limited data validation (Stage 2B) will be performed and a Data Usability Summary Report (DUSR) for each matrix will be prepared following the guidelines provided in NYSDEC DER-10, Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports, May 2010. Data validation will be performed by a qualified AECOM chemist independent of the data collection activities.

13. Location and elevation survey of the borings and monitoring wells will be performed by an AECOM subcontractor.

14. AECOM will visually inspect the interior of the on-site water supply well utilizing a downhole camera to visually evaluate the well's structural integrity, assess construction details such as casing depth, screen intervals, and seals.

1.2 Site Description and Background Information

The Site is located at 6 Old River Road in Glenmont, New York. The 2.70 acre Site is located in the Town of Bethlehem, just south of the port of Albany. The Site lies within a rural light industrial zone extending to the north and south, with commercial and residential properties present to the north, east and west. Railroad tracks border the east side of the Site, separating it from the Beacon Island fly ash landfill. The landfill is situated along the Hudson River. The Site contains an approximately 14,000-square-foot warehouse, built in 1950, with private water and sewer systems, and an electric connection. The building is currently occupied by a manufacturing/ packaging operation.

1.2.1 Site History

The Site formerly operated as a ceramic kitchen tile showroom, as well as a motorcycle supply shop. It is currently unknown when the businesses at the Site transitioned; however, the current owner has owned the property for approximately 40 years. NYSDEC Spill #2401808 was reported in relation to the results of a Focused Phase 2 Environmental Site Assessment (ESA) performed by Hanson Van Vleet Hydrogeologic Consultants, PLLC (Hanson Van Vleet) in February of 2024. Preliminary findings from the report indicate the presence of chlorinated volatile organic compounds in an onsite private water supply well. Detected compounds include cis-1,2-dichloroethene, trichloroethene, vinyl chloride, and 1,2-dichloroethane.

The Focused ESA by Hanson Van Vleet was found to be inconclusive by the Division of Environmental Remediation, with respect to the potential source and associated soil vapor intrusion impacts. Further characterization of the Site is necessary to determine the presence and locations of all contaminants, with their concentrations.

2. General and Preparatory Field Activities

The scope of work will be established in the work assignment as documented in the site-specific Work Plan.

The work assignment may include a variety of field activities intended to obtain site-specific data pertaining to the extent of contamination and the extent to which releases or potential releases from the site pose a threat to human health and the environment. Typical project objectives include:

- Characterize site geology;
- Characterize site hydrogeology;
- Evaluate areal and vertical extent of contamination, including transport mechanisms;
- Assess the source(s) of contamination and determine if this source(s) has impacted the existing on-site building, off-site properties or sensitive receptors; and
- Collect additional data to support further remedial investigation and/or remedial actions.

To accomplish these objectives, the field subtasks described in this FAP may be utilized. Additional methodology information will be provided in the QAPP. Unless otherwise noted, it is assumed that all field work will be completed at Level D personal protection in accordance with the HASP. Field activities will be monitored by a qualified AECOM representative(s).

2.1 Mobilization

Following authorization to proceed with the field investigation from NYSDEC, AECOM and its subcontractors will mobilize necessary materials and equipment to the site. Due to the intrusive nature of the work being performed Nothnagle Drilling as the subcontractor performing the work, will place a call to DigSafely New York for utility mark out. Utility clearance is detailed in Section 2.3.

Site preparation will be performed by AECOM's drilling subcontractor, Nothnagle Drilling, under direction by AECOM.

Site preparation activities include:

1. Construct a temporary decontamination pad on an existing concrete slab for decontamination of tools and equipment. The temporary decontamination pad will be lined with plastic sheeting so wash water can be collected, containerized, and properly disposed. Following field work, the temporary decontamination pad will be disassembled and removed from the Site.
2. Establish an investigative derived waste (IDW) staging area on an existing concrete slab.

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.

2.2 Health and Safety

It is anticipated that the work to be completed at typical sites will be performed in Level D personal protection with the potential to upgrade to Level C. 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 threat to field personnel or warrant an 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 AECOM's regional safety manager.

2.3 Utility Clearance: Callout

Intrusive activities will be conducted during a typical site investigation including hand cleaning/soft-dig of soil borings and monitoring well installations. Prior to the start of intrusive activities, a call will be placed to New York DIG SAFE CALL CENTER at Dig Safely New York (for all areas north of New York City) 811 (http://www.digsafelynewyork.com) or 1-800-962-7960 for utility mark outs to minimize the risk of encountering subsurface utilities.

2.4 Geophysical Surveys

Geophysical surveys will be conducted by GPRS, Inc. to screen for and identify the presence of underground utilities or any anomalies (e.g., underground storage tanks) within the work areas where soil vapor points will be installed and where hollow stem auger drilling will be conducted. The subcontractor will use both ground penetrating radar (GPR) and electromagnetic conductivity (EMC) methods necessary to confirm utility clearance. Subsurface utilities and/or anomalies shall be identified and marked in the field with spray paint as they are located and a report that summarizes the findings of the survey shall be submitted seven calendar days after completion of the survey.

Ground-Penetrating Radar (GPR)

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.

2.5 Utility Clearance: Hand Tools and Air Knife

Excavation with hand tools allows for excavation near subsurface utilities with reduced chance of impacting the utilities. Hand clearing will be conducted for all soil boring locations by AECOM's drilling subcontractor, Nothnagle Drilling, under direction by AECOM.

Procedure:

1. Excavate a two-foot square by approximately five-foot deep area manually using post-hole diggers, pry bars, and/or hand digging. An air knife will be used as needed to advance through areas of dense overburden.
2. After the location is cleared for drilling, the hole will be backfilled flush with the ground surface using the excavated spoils (small rocks and debris removed).
3. Excavated material not returned to the hole will be drummed along with the monitoring well boring spoils for proper disposal.

2.6 Community Air Monitoring

Community air monitoring will be performed as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), unless some of the provisions of the CAMP are not appropriate for a specific work assignment. AECOM's approach to implementing the Generic CAMP is provided in Section 8.0 of this FAP. The CAMP is also provided in Appendix E (of the SCWP) – Community Air Monitoring Plan.

2.7 Site Survey

Project surveying performed by AECOM subcontractor, KHEOPS Architecture, Engineering and Survey DPC (MBE) will provide data necessary to plot groundwater monitoring wells on the existing base map. All surveying will be performed under the supervision of a New York State licensed land surveyor, following the requirements of the Scope of Work and HASP.

The horizontal positions will be tied into the North American Datum 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88). The measuring point 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 supplied in a digital CAD format (i.e., .dwg or .dxf files in the cited coordinate systems).

2.8 Green and Sustainable Remediation

The work to be completed will comply with NYSDEC guidance documents including DER-31: Green Remediation (2010b). To ensure compliance with DER-31, the work will be completed using the best management practices (BMPs) and techniques described below. In addition to the items discussed in Section 9.0 – Field Records and Documentation, specific reporting methods relative to DER-31 are further described in the following subsection.

2.8.1 Best Practices and Techniques

DER-31 provides some examples of BMPs that could be applied during all phases of remediation (see Attachment 1 of the DER-31 policy). Additional resources to identify potential BMPs and techniques applicable to this work include:

- United States Environmental Protection Agency CLU-IN Green Remediation (www.clu-in.org/greenremediation/);
- Interstate Technology & Regulatory Council Green and Sustainable Remediation (www.itrcweb.org/teampublic_GSR.asp);
- NAVFAC Green and Sustainable Remediation (www.ert2.org/t2gsrportal/);
- Air Force Center for Engineering and the Environment Sustainable Remediation (www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/index.asp); and
- Sustainable Remediation Forum (www.sustainableremediation.org).

Lastly, NYSDEC expects that the BMPs identified below will be implemented at sites unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach:

- Use renewable energy where possible or purchase Renewable Energy Credits (RECs);
- Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only);
- Incorporate green building design;
- Reuse existing buildings and infrastructure to reduce waste;
- Reuse and Recycle construction and demolition (C&D) debris and other materials (i.e., grind waste wood and other organics for on-site use);
- Design cover systems to be usable (i.e., habitat or recreation);
- Reduce vehicle idling;

- Use of Low Sulfur Diesel Fuel (LSDF) or alternate fuels (i.e., biodiesel or E85);
- Sequence work to minimize double-handling of materials; and
- Use energy efficient systems and office equipment in the job trailer.

Prior to initiating any field work, the Project Manager will identify applicable BMPs to be used for each work assignment. At a minimum, each BMP identified above will be included in the site-specific work plan with a discussion of how each practice or technique will be implemented or why a practice or technique is not appropriate to the work anticipated at the site.

2.8.2 Reporting

All Green and Sustainable BMPs employed during field activities will be discussed within the field log books described in Section 9.0 – Field Records and Documentation. Specifically, the field log books will acknowledge that the practices and techniques identified for the site work were taken each day (if applicable). In addition, the following information will be recorded within the field log books at the close of each day:

- The estimated quantity of fuel consumed by onsite vehicles and equipment;
- The estimated distance traveled by trucks and equipment delivering goods or removing waste; and
- The estimated water use during onsite activities.

The information will be compiled and presented to NYSDEC in a form suitable to the site-specific work completed.

3. Drilling Procedures

Drilling activities for a maximum of four (4) soil borings and the installation of four (4) overburden monitoring wells will be conducted according to the SOW and will utilize HSA drilling.

Procedures for specific sampling activities are described below. The procedures proposed for this investigation are discussed in this section and will be implemented by a subcontractor under the direct supervision of an AECOM employee. When sampling for PFAS, see Appendix A for special field procedures.

3.1 Hollow-Stem Auger Drilling Procedures

A standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. HSAs, drill rods, and the drill rig will be thoroughly decontaminated prior to initial borehole installation and between each borehole at the centralized decontamination area. All decontamination liquids will be collected and placed in DOT-approved 55-gallon drums.
2. The drill rig will be inspected for oil leaks and any leaks reported prior to starting drilling operations.
3. Advance the boring by rotating and advancing the HSAs to the desired depth. The borings will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.
4. Remove center plug from the HSAs and collect a split spoon sample per the method stipulated by the project geologist or hydrogeologist.

References: American Society for Testing and Materials (ASTM) D1452/D1452M-16.

4. Groundwater Investigation Tasks

A groundwater investigation will be conducted as part of the Site Characterization Investigation. Field activities that will be implemented as part of a groundwater investigation include (but are not limited to) the following:

- Existing Well Condition Survey
- Groundwater Elevation Survey
- Monitoring Well Installation
- Monitoring Well Development
- Groundwater Sampling from Monitoring Wells and Existing Supply Well

When sampling for PFAS, see Appendix A for special field procedures.

4.1 Existing On-Site Supply Well Inspection

An assessment of the condition of the existing on-site supply well is necessary in order to determine the well's structural integrity, assess construction details such as casing depth, screen intervals, and seals.

The following procedure should be employed when opening for gauging, sampling and inspection:

1. Use the Monitoring Well Inspection Form (Appendix B) to record the conditions of the various components of the monitoring well and protective casing including lock/hasp, hinge/lid, J-plug, gasket seal, and security bolts.
2. Coat security bolts with never seize to prevent seizure in the cast iron flush mount curb boxes.
3. In wells, record depth to water, depth to bottom, and depths to the top and bottom of any light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) layers.
4. Deploy a downhole camera into the well to collect video and photographs of the well condition.
5. Record any maintenance performed on the well and stencil as needed.
6. All sections of the inspection form should be completed, and photographs taken before and after inspection and maintenance.

4.2 Groundwater Elevation Survey

To better understand the hydrogeologic conditions, synoptic water level readings will be collected by AECOM prior to groundwater sampling.

Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic water level indicator. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions.

Water level measurement procedures are presented below.

Procedure:

1. Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section 7.1) and test water level meter to ensure that the batteries are charged.
2. Lower the probe slowly into the monitoring well until the audible alarm indicates water.

3. Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference point.
4. Repeat the measurement for confirmation and record the water level.
5. Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.
6. Replace the well cap and lock protective cap in place.
7. Decontaminate the water level meter (Section 7.0) if additional measurements are to be taken.

Reference: ASTM D4750-87(2001).

4.3 LNAPL/DNAPL Water Level Survey Procedures

When conducting groundwater measurement from monitoring wells, the presence and thickness of Light Non-Aqueous Phase Liquids (LNAPL) and Dense Non-Aqueous Phase Liquids (DNAPL) will be monitored. The following procedure will be used to determine the presence and thickness of LNAPL and DNAPL. LNAPLs are typically measured using an oil/water interface meter.

Procedure:

1. To meet safety requirements and protect electronics from damage, always ground the meter by attaching the ground clamp to the metal well casing.
2. Before beginning any measurement, check the electronics and battery condition by pressing the ‘START/OFF’ button. A brief tone and red light indicate the meter is functional. A flashing green light indicates the meter is on. NOTE: The meter will automatically shut off after 10 min to conserve battery life and will have to be turned back on.
3. Lower the probe end into the well and slowly lower until water or LNAPL is contacted. A steady tone and light indicate a non-conductive liquid (e.g. product). An intermittent tone and light indicate a conductive liquid (e.g. water).
4. For floating product (LNAPL), take the air/product interface measurement on the way into the liquid and the water/product interface on the way up. When passing through product into water, some product may adhere to the probe sensors due to surface tension. Therefore, when water is detected below the product, the probe should be raised and lowered rapidly in a short vertical motion to remove any product that may have been carried down with the probe.
5. The water/product interface should then be measured as the probe is raised very slowly back up. Once the interface is detected the probe can be raised and lowered in small increments to precisely determine the interface.
6. Repeat measurements to confirm water/product interface.
7. To determine the thickness of product, subtract the water/product interface from the product/air interface.
8. To determine if there is any sinking product (DNAPL) in the well, continue lowering the probe slowly. If steady signals activate, determine the top of the sinking layer by reading directly from the tape. Continue lowering the probe slowly until the tape slackens when the well bottom is reached. Read the level directly from the tape and subtract one from the other to determine thickness.
9. Upon completion of readings clean the tape and the probe.

4.4 Monitoring Well Installation

The approved number and proposed locations of monitoring wells are shown in Figure 2 – Proposed Boring and Monitoring Well Location Plan. The actual location and number of monitoring wells will be determined by the on-site supervising AECOM geologist and/or NYSDEC Project Manager.

Prior to advancing augers, the geophysical survey will be performed, and the borings will be hand cleared to five feet bgs. A maximum of four (4) borings will be advanced to the target depth of approximately twenty-five (25) feet bgs, or until bedrock is encountered.

The default method for advancing overburden borings for monitoring well installation will be using 4¼-inch HSAs with a center plug. The HSAs will be advanced to the target depth for well installation. If difficulties with running sands are encountered which hinder drilling, potable water may be introduced into the HSAs to maintain a positive hydrostatic head. For difficult overburden drilling or for wells installed in bedrock, water rotary drilling methods will be employed.

Subsurface soil samples will be obtained in accordance with Section 5 and logged in accordance with Section 9. Soil cuttings will be screened for organic vapors using a PID.

4.4.1 Overburden Monitoring Well Construction Procedures

Four (4) overburden monitoring wells will be installed during this Site Characterization at a target depth of approximately 25 feet bgs, or until refusal/bedrock is encountered. The screen will be in stalled at a depth where it will straddle the water table. The wells will be constructed with 10-foot-long, 2-inch inside diameter #10 slot PVC screen attached to a 2-inch inside diameter Schedule 40 PVC riser to the ground surface and a 1-foot long Schedule 40 PVC sump at the bottom below the screen section.

The groundwater monitoring wells will be installed during this investigation using the procedures described below.

Procedure:

1. Advance subsurface boring to the desired depth by means of hollow-stem auger drilling.
2. While boring, collect split spoon samples on a continuous basis to geologically log the boring.
3. Remove center plug from augers and verify borehole depth using weighted measuring tape.
4. Add washed and graded medium sand as needed to base of borehole.
5. Insert the sump section, well screen and riser pipe into borehole through the hollow stem augers. Cap the riser to prevent well construction materials from entering the well.
6. Add #2 sand to screen section of well while slowly removing augers. Sand pack should extend at least two feet above the top of the screen section. Measure with a tape.
7. Slowly add bentonite pellet seal to borehole as augers are slowly removed. The bentonite seal should extend at least two feet above the top of the sand pack section. Measure with tape.
8. Note: The rate of removal of the auger from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.
9. If bentonite seal is placed above the groundwater level within the borehole, add water to the borehole to hydrate the bentonite pellets. Allow pellets to hydrate for at least 30 minutes.
10. Mix cement/bentonite grout per manufacturer’s specifications.

11. Add grout to borehole through tremie pipe or hose from the top of the bentonite seal to the ground surface.
12. Remove remaining augers from the borehole.
13. Top off grout in borehole. Grout should extend to approximately two feet below ground surface.
14. Cut well-riser pipe to about three feet above the ground surface for stickup type wells. Flush-mount well risers should be cut off just below surface grade.
15. Backfill the remaining two feet of the borehole with concrete.
16. Install a protective casing over the well riser pipe and set it into the concrete backfill.
17. Lock the protective casing cover.
18. Document well construction in the field notebook and on a Well Construction Detail diagram (Appendix B).

Reference: ASTM D5092/D5092M-16.

4.5 Well Development

Following completion of groundwater monitoring well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state. Developing the monitoring well not only removes any sediment but also may improve the hydraulic properties of the formation.

The effectiveness of the development measures will be closely monitored to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidimeter will be used to monitor effectiveness of development. A turbidity reading of < 10 Nephelometric Turbidity Units (NTU) (if possible) and steady-state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development. When sampling for PFAS, see Appendix A for special field procedures.

Procedure:

1. An appropriate monitoring well development method should be selected, depending on water level depth, well productivity, and sediment content of water. Monitoring well development options include: (a) manual pumping; and (b) powered suction-lift or hydrolift pumping.
2. Equipment should be assembled, decontaminated (if necessary), and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.
3. Monitoring well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. All development waters will be containerized. Effectiveness of development should be monitored at regular intervals using a portable turbidimeter and water quality meter. Volume of water removed, and turbidity, pH, temperature, and conductivity measurements will be recorded on a Well Development/Purging Log form (Appendix B).
4. Monitoring well development will be discontinued when the turbidity of the discharged water is below 10 NTU (if possible) and the other indicator parameters have stabilized.

Reference: ASTM D5092/D5092M-16.

4.6 Groundwater Sampling from Monitoring Wells

Groundwater sampling will be performed to evaluate the extent of groundwater contamination. The on-site supply well and the four (4) newly installed overburden monitoring wells (with no measurable free product) will be sampled for TCL VOCs (by EPA Method 8260C), TCL SVOCs including 1,4-dioxaine (by EPA Method 8270D/8270 SIM), TAL Metals (by EPA Method 6010C), Mercury (by EPA Method 7470A), Cyanide (by EPA Method 9010), TCL PCBs (by EPA Method 8082A), TCL Herbicides/Pesticides (by EPA Methods 8151A/8081B) and PFAS (by EPA Method 1633A).

The proposed locations of soil borings/ monitoring wells can be found on Figure 2 – Proposed Boring and Monitoring Well Location Plan, Table 2 – Monitoring Well Sampling Plan, and in the QAPP.

4.6.1 Low-Flow Sampling Technique

Groundwater sampling will be done 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).

Monitoring well purging will be completed using the low-flow purging technique as follows:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.
2. Using an electronic interface probe/water level detector, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells.
3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).
4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., Solinst or Geopump) and dedicated HDPE tubing. New dedicated tubing will be used for each well.
5. Purge the well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity – +/- 3% full-scale range; pH – +/- 0.10 pH unit; dissolved oxygen – +/- 10%, Turbidity – +/- 10% and oxidation/reduction (redox) potential – +/- 10 units.
6. Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.
7. Indicator parameters of pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, turbidity, and temperature must be measured continuously using the flow cell.
8. Well purging data are to be recorded in the field notebook and on the Low Flow Purge Log (Appendix B).

4.6.2 Sample Collection Procedures

Procedure:

After well purging is completed, a sample will be collected into the appropriate containers.

1. Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.
2. All sample bottles will be labeled in the field using a waterproof permanent marker (Section 9.4).
3. Samples will be collected into sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.
4. Remove pump and disconnect valves and tubing, as necessary. If a submersible pump was used, it must be decontaminated prior to and between each use. Clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.
5. Well sampling data are to be recorded in the field notebook and on the Well Purging Log (Appendix B).

4.6.3 Sampling Through LNAPL

Procedure:

1. Measure the depth and thickness of the LNAPL layer per Section 4.3.
2. The groundwater sample from below the product will be collected through a 1-inch ID tremie pipe immersed below the LNAPL layer.
3. Insert a slip cap or similar device (i.e., J-plug) to plug the end of the 1” ID PVC pipe and attach a tether to the device so it can be retrieved from the well after sampling is complete. The pipe will be lowered into the well and additional sections of 1” ID PVC pipe will be added, as necessary.
4. Lower the 1” ID PVC pipe into the well with the slip cap/J-plug inserted in the bottom of the pipe. The bottom of the pipe should be lowered through and at least 2’ below the bottom of the LNAPL layer.
5. Brace the 1” ID pipe at the surface so it cannot fall further into the 2” well casing.
6. Smaller diameter rods or a weighted section of steel pipe attached to a rope will be used to push the slip cap off the end of the 1” ID PVC pipe. The attached tether will allow retrieval of the J-plug when the 1” tubing is retrieved from the well at the conclusion of sampling.
7. Proceed with sampling the well by inserting purging and sampling tubing through the 1” tubing.
8. When sampling is finished, remove the 1” tubing and slip cap from the well. The 1” ID PVC pipe will be partially coated with LNAPL and should be discarded. The slip cap can be decontaminated or discarded.

4.6.4 Sampling LNAPL or DNAPL

When conducting groundwater sampling from monitoring wells, LNAPL and DNAPL may be collected. The following procedure will be used to collect samples of LNAPL and DNAPL:

1. Measure the depth and thickness of the LNAPL/DNAPL layer per Section 4.3.
2. Using a disposable Teflon or Teflon lined bailer attached to disposable poly twine, lower the bailer so the bottom of the bailer is at the same depth as the bottom of the LNAPL/DNAPL layer.

3. Upon reaching its target depth, raise the bailer with the LNAPL/DNAPL product and place the product in the laboratory supplied containers.
4. Repeat steps 2 and 3 until the laboratory supplied containers are full or there is no more product to remove.
5. Upon completion of the sampling, place the used bailer and twine in a 1A2 open head 55-gallon steel drum.

4.7 Monitoring Well Decommissioning

1. Monitoring well decommissioning will be performed in accordance with NYSDEC Policy CP-43, using the following steps:
2. Each well will be tremie grouted from the bottom of the well to within five feet of the ground surface to ensure a continuous grout column. Grout slurry composition should be the following:
3. 1.5 to 3.0 percent by weight - Bentonite (Quick Gel)
4. 40 to 60 percent by weight - Cement (Portland Type I)
5. 40 to 60 percent by weight - Water
6. The well casing will be removed at a depth of five feet below grade (if possible) and the outer protective casing "stick-up" and/or flush-mount curb box will be removed only after the well has been properly filled with grout.
7. A metal marker (PK Survey Spike) will be embedded in the top of the grout to indicate the location of the former monitoring well.
8. The uppermost five feet of the borehole will be filled with approved/clean backfill or topsoil.
9. The surface of the borehole will be restored to the condition of the area surrounding the borehole (crushed stone, asphalt, etc.). If the surrounding surface is a concrete sidewalk flag, that flag will be replaced in accordance with applicable regulations/standards.
10. The solid waste should be handled is accordance with Section 7.2 of this plan.
11. Document well construction details in the field notebook and transfer the data onto the Well Decommissioning Record form (Appendix B).

Reference: ASTM D5299/D5299M-18

Reference: NYSDEC CP-43: Groundwater Monitoring Well Decommissioning Policy, November 3, 2009.

4.8 Plugging/Abandoning Borehole and Grout Mixing

If any boreholes are not completed as monitoring wells, they will be sealed (plugged) prior to abandonment to prevent downhole contamination. In addition, the annular space in monitoring wells need to be sealed after the installation of the sand pack and bentonite seal to prevent any downward migration of surface water into the well. Sealing can be achieved by backfilling the borehole with bentonite below the water table (hole plug or pellets) and/or with a cement/bentonite grout above the water table. The backfill material will be introduced from bottom to top using either a tremie pipe or the drill rods. Shallow borings will be sealed with bentonite (hole plug or pellets) the entire length of the boring.

Procedure:

1. Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

   Grout Slurry Composition (Percent Weight)

   1.5 to 3.0 percent - Bentonite (Quick Gel)

   40 to 60 percent - Cement (Portland Type I)

   40 to 60 percent - Water

2. Calculate the volume of the borehole based on the bit or auger head diameter plus 10 percent and determine the volume of grout to be emplaced. Generally, the total mixed volume is the borehole volume plus 20 percent.
3. Identify the equipment to be used for preparing and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes.
4. Identify the source of the water to be used for the grout and determine its suitability for use. In particular, water with high sulfate or chloride levels, or heated water, should not be used. These types of waters can cause operational difficulties or modify the set-up for the grout.
5. Identify the equipment to be used for emplacing the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.
6. Identify the volumes to be pumped at each stage or in total if only one stage is to be used.
7. Prepare the borehole plugging plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.
8. Begin mixing the grout to be emplaced.
9. Record the type and amount of materials used during the mixing operation. Ensure that the ratios are within specification tolerance.
10. Begin pumping the grout through the return line bypass system to confirm that all pump and surface fittings are secure.
11. Initiate downhole pumping. Record the times and volumes emplaced on the form.
12. Document the borehole is completely filled with grout.
13. Clear and clean the surface near the borehole. Level the ground to about the pre-existing grade. Add grout or cement as necessary to the area near the borehole.

Note: On occasion, there may be some settling of the grout, which takes place over several days. If this settling occurs, the natural soil from the immediate vicinity is used to put the level at grade. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken.

5. Soil Sampling Activities

Soil sampling activities will include subsurface soil sampling. Procedures for this activity are described below.

5.1 Subsurface Soil Sampling

Borings will be advanced at a maximum of four (4) approved locations, dependent on the total number of existing wells requiring replacement following their inspection. All borings will be hand cleared to five (5) feet bgs, and advanced to bedrock using 4¼ I.D. HSAs. Split spoon samples will be collected continuously and logged using standard penetration techniques from the ground surface to the target depth of 25 feet bgs, or refusal/bedrock, if encountered.

5.1.1 Split Spoon Sampling Procedures

Split-spoon samples will be collected during boring advancement at continuous 2-foot intervals. All soil samples will be visually described and classified, inspected for signs of contamination, and screened with a photoionization detector (PID) for the presence of organic vapors by the supervising AECOM geologist. Soil samples yielding the highest PID readings, or from directly above the water table will be collected and cooled on ice to be sent for laboratory analysis. When sampling for PFAS, see Appendix A for special field procedures.

Soil samples collected from the four (4) soil borings installed to construct new wells will be analyzed for the following parameters (via a NYSDEC call-out laboratory [Pace Analytical]): TCL VOCs (by EPA Method 8260D), TCL SVOCs including 1,4-dioxaine (by EPA Method 8270D/8270 SIM), TAL Metals (by EPA Method 6010C), Mercury (by EPA Method 7471A), Cyanide (by EPA Method 9010), TCL PCBs (by EPA Method 8082), TCL Herbicides/Pesticides (by EPA Methods 8151A/8081) and PFAS (by EPA Method 1633A).

Procedure:

1. Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 pounds.).
2. Clean out the HSAs to the bottom depth prior to sampling. Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).
3. Lower the decontaminated 2-inch outside diameter (O.D.) split-spoon to the bottom of the HSAs and check the depth against length of the rods and the split-spoon.
4. Attach the drive head and hammer to the drill rods without the weight of the hammer resting on the rods.
5. Lower the weight and allow the split-spoon to settle up to 6 inches below the bottom of the HSAs. If it settles more, consider use of another type of sampler.
6. Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the split-spoon resting on the bottom of the hole, drive the split-spoon with the 140-pound hammer falling freely over its 30-inch fall until 24 inches have been penetrated or 50 blows have applied in any 6-inch interval.
7. Record the number of blows required to drive the split-spoon 6 inches into the overburden. Determine the "N" value by adding the blows for the 6-to 12-inch and 12-to 18-inch interval of each sample attempt.
8. After penetration is complete, remove the split-spoon sampler.

9. Open the split-spoon to determine the percent recovery and describe the soil.
10. Split the sample lengthwise and screen the soil with a PID for volatile organic vapors.
11. Document all properties and sample locations in the field notebook, and on the Boring Log form (Appendix B).

Reference: ASTM D1586/ D1586M-18.

Unified Soil Classification System

Soils are classified for engineering purposes according to the Unified Soil Classification System (USCS) adopted by the U.S. Army Corps of Engineers and U.S. Department of the Interior Bureau of Reclamation. Soil properties that form the basis for the USCS are:

- Percentage of gravel, sand, and fines;
- Shape of the grain-size distribution curve; and
- Plasticity and compressibility characteristics.

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to be the 200-mesh sieve (0.074 mm). In the field the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)
P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074mm)
C: Clayey (>12% finer than 0.074mm); plastic (clayey) fines. Fine fraction above the A- line with plasticity index above 7.
M: Silty (>12% finer than 0.074 mm); non-plastic or silty fines. Fine fraction below the A- line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher than 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic soils (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

Reference: ASTM D2487-17.

5.1.2 Visual Identification

Soil samples collected during boring advancement will be visually identified. Soil properties required to define the USCS classification of a soil and other observed characteristics normally identified in describing a soil are defined below:

a. Color
b. Moisture conditions
c. Grain size:
    i. Estimated maximum grain size
    ii. Estimated percent by weight of fines (material passing No. 200 sieve)
d. Gradation
e. Grain shape
f. Plasticity
g. Predominant soil type
h. Secondary components of soil
i. Classification symbol
j. Other features such as:
    i. organic, chemical, or metallic content;
    ii. compactness;
    iii. consistency;
    iv. cohesiveness near plastic limit;
    v. dry strength; and
    vi. source - residual, or transported (aeolian, water borne, glacial deposit, etc.)

Reference: ASTM D2488-17.

6. Soil Vapor Intrusion Studies

Work assignments may include a Soil Vapor Intrusion (SVI) study to evaluate the sub-slab soil vapor, indoor air, and outdoor air at the project site.

Soil vapor samples are collected from locations which are not beneath the foundation or slab of a building. Sub-slab soil vapor samples are collected from immediately beneath the slabs of the selected buildings. The indoor air samples will be collected from the basement and/or first floor of the selected buildings. The outdoor air samples are collected to characterize site-specific background (ambient) outdoor air conditions (i.e., from upwind of the structures at a breathing zone height).

Details of the typical field activities associated with SVI studies are presented in this section of the FAP.

6.1 SVI Study Objectives

The objective of the Soil Vapor Intrusion study is to evaluate whether vapor intrusion of compounds related to the site or suspected source is occurring in the structures within the Study Area and whether vapor hazards as a result of the soil or groundwater contamination may exist for receptors associated the existing structures in the Study Area. The SVI study results may be used to identify the structures within the study area that require further investigation or mitigation/remediation.

The following tasks will typically be performed:

- Task 1 – Procurement of Access Agreements
- Task 2 – Location Mark-Out and Utility Clearance Activity
- Task 3 – Building Survey and Product Inventory in accordance with NYSDOH Guidelines
- Task 4 – Sample Collection and Analysis
- Task 5 – Data Evaluation and Report Preparation

6.2 SVI Study Field Sampling Plan

This section outlines the procedures that will be used in the collection of sub-slab soil vapor samples, indoor air samples and outdoor air samples.

6.2.1 Access Agreements

A representative from the NYSDEC will contact the owner and tenants of each of the proposed sampling location sites within the Study Area to obtain permission to perform the work. AECOM will explain the scope of work and the proposed work schedule to the owner/tenant of each site within the Study Area.

6.2.2 Location Markout and Utility Clearance Activity

Prior to commencement of the sub-slab soil vapor sampling, AECOM will engage a geophysical subcontractor (see Section 2.4) who will delineate potential subsurface utilities at the structures using electromagnetic utility locating instruments. Utility markouts by the local One-Call center and any information provided by the building occupants will be considered when locating the soil vapor and sub-slab soil vapor locations in the field.

6.2.3 Building Survey and Product Inventory

As required by the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (SVI Guidance; NYSDOH, 2006), a building survey will be performed to identify and minimize conditions that may interfere with the proposed testing prior to collecting samples at each structure. The building survey will evaluate the type of building structure, floor layout, air-flow patterns (e.g., using smoke tubes), and the physical condition of the buildings being studied. Information obtained during the building survey, including information on sources of potential indoor air contamination, will be identified on the NYSDOH Indoor Air Quality Questionnaire and Building Inventory Form (NYSDOH, 2006; Appendix B). As shown in NYSDOH Appendix B, specific information to be evaluated and noted during the building survey includes the following:

1. Occupant name(s) and address;
2. Owner or landlord information;
3. Building characteristics (e.g., commercial/industrial, number of units/tenants, number of floors, building age, etc.);
4. Construction characteristics, including foundation cracks and utility penetrations, ceiling construction and firewall separations, or other openings that may serve as preferential pathways for vapor intrusion;
5. Heating, ventilation, and air conditioning systems, including the type of heating system(s), type of fuel used, presence of a boiler/furnace, presence of aboveground or underground storage tanks, type(s) of air conditioning, and the presence of air distribution ducts;
6. Occupancy and the general use of each floor;
7. Factors that may influence indoor air quality, including attached garages, separate heating units in the garage, petroleum-powered machines stored in the garage, workshop or craft area, smoking in the building, exhaust fans in the kitchen or bathrooms, new carpets, fresh paints, etc.; and,
8. Type of water supply and sewage disposal.

A product inventory will also be conducted throughout each floor and the basement of each structure to identify chemicals and products that may bias sampling results. Product names and chemical ingredients listed on container labels will be recorded. If the ingredients are not listed on the label, the product's exact and full name, and manufacturer information, will be recorded. Chemicals or products that are noted as being stored in a questionable manner (e.g., in an open container), that emit odor, or yield positive field screening results, will need to be controlled during the indoor air quality sampling to reduce potential interferences. Control options will be discussed with the building occupant and will include removal of the container (preferred option) or tightly sealing the containers.

The presence and description of odors and portable vapor monitoring equipment readings (e.g., PID readings) will be noted. Photographs will also be taken as appropriate during the building survey. Floor plans will be sketched to indicate sub-slab soil vapor and indoor air sampling locations, possible indoor air pollution sources, and PID meter readings. The PID meter will have a detection limit of 1 part per million (ppm).

The building superintendent/facility manager will also be questioned to provide information regarding the location of any potential utilities in the locations that are to be sampled.

Typically, the site-specific Work Plan will indicate the general approach and locations of sample locations for the SVI; however, the exact location of the sub-slab soil vapor, indoor air, and outdoor air samples will be determined during the implementation of the study.

6.3 Vapor Pin Installation

Each of the sub-slab vapor points will be installed with a stainless-steel Vapor Pin® apparatus. Standard Operating Procedures (SOPs) for installation, leak testing, and flush mount secure cover installation (in the event permanent points are required) of Vapor Pin® sampling equipment are provided in Appendix C. The sub-slab points will be drilled completely through the building slab and approximately one inch into the underlying soil. Each vapor pin will be sealed and tested for integrity using the helium shroud testing method.

6.4 Soil Vapor and Air Sample Collection and Analysis

Procedures for collection of soil vapor, sub-slab soil vapor, and indoor and outdoor air samples are provided below.

6.4.1 Soil Vapor Sampling

Soil vapor probe installations may be permanent, semi-permanent or temporary. In general, permanent or semi-permanent installations are preferred for data consistency reasons and to ensure outdoor air infiltration does not occur. Temporary probes should only be used if measures are taken to ensure that an adequate surface seal is created to prevent outdoor air infiltration and if tracer gas is used at every sampling location. Soil vapor implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies.

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

1. At least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of the sample probe and tube) should be purged prior to collecting the samples;
2. Flow rates for both purging and collecting should not exceed 200 mL/min to minimize outdoor air infiltration during sampling;
3. Samples should be collected, using conventional sampling methods, in an appropriate container, one which
    a. Meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),
    b. Is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and
    c. Is certified clean by the laboratory;
4. Sample size depends upon the volume of that will achieve minimum reporting limits; and
5. A tracer gas (e.g., helium) should be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring).

In some cases, weather conditions may present certain limitations on soil vapor sampling. For example, condensation in the sample tubing may be encountered during winter sampling due to low outdoor air temperatures. Devices, such as tube warmers, may be used to address these conditions. AECOM will discuss anticipated limitations to the sampling with NYSDEC prior to the sampling event so appropriate measures to address these difficulties are established in the site-

specific FAP. When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (north);
- Weather conditions (e.g., precipitation and outdoor temperature) should be noted for the past 24 to 48 hours; and
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additional information that could be gathered to assist in the interpretation of the results includes barometric pressure, wind speed and wind direction. The field sampling team should maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- purge volumes,
- volume of soil vapor extracted,
- if Summa® canisters are used, note the vacuum before and after samples were collected,
  - The February 2008 update to the 2005 NYSDEC ASP (NYSDEC, 2008) specifies allowable pressures (vacuum) for canisters. The initial canister vacuum must be 28 inches Hg ± 2-inch Hg. The final canister pressure vacuum should be 5 inches Hg ± 1-inch Hg. If final canister pressures are not within this range, contact the NYSDEC project manager before instructing the laboratory to analyze the canisters.
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and;
- Chain of custody protocols and records used to track samples from sampling point to analysis.

6.4.2 Sub-Slab Soil Vapor Sampling

Sub-slab soil gas samples will be collected from the buildings or other locations as described in the site-specific Work Plan. Each of the sub-slab vapor points will be installed with a stainless-steel Vapor Pin® apparatus. Standard Operating Procedures (SOPs) for installation, leak testing, and flush mount secure cover installation (in the event permanent points are required) of Vapor Pin® sampling equipment are provided in Appendix C.

In accordance with NYSDOH SVI Guidance (October 2006), a temporary sample point will be advanced to collect sub-slab soil gas sample at pre-selected locations. If possible, the heating/cooling system at each of the structures will be operated continuously to maintain a normal temperature (i.e., 65º to 75º F) for at least 24 hours prior to and during the scheduled sampling time. The samples will be collected from a depth of approximately 2 to 6 inches below the floor slab.

The following steps will be taken to collect samples:

1. Select and prepare the sub-slab sample collection point by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and a potential location of a subsurface probe will be selected. The location will ideally be central to the building, and away from the foundation walls, apparent penetrations and buried pipes (as indicated by the geophysical survey). Photograph and document all sample locations.
2. In locations where bare concrete is available, drill a 5/8-inch diameter hole about one-inch (1") into the concrete using an electric hammer drill. The hole must be 5/8-inch in diameter to ensure a seal. Lengthen the hole about one inch (1") beyond the sub-slab using the drill bit to create a void.
3. Remove the concrete dust within the 5/8-inch drilled hole and around the hole using wire brushes and a brush and dust pan, then dabbing the surface with Sculpey brand clay (see below).
4. Place the lower end of the Vapor Pin® Sampling Device assembly into the drilled hole. Place the small hole located in the handle of the Installation/Extraction Tool, over the Vapor Pin® to protect the barb fitting and tap the Vapor Pin® into place using a dead blow hammer. Make sure the Installation/Extraction Tool is aligned parallel to the Vapor Pin® to avoid damaging the barb.
5. Seal the annular space between the 5/8-inch hole and the Teflon tubing with white Sculpey Brand modeling clay (or equivalent). Bring the clay above the floor's surface and around the tubing in a volcano-like shape.
6. Remove the Vapor Pin® Cap and connect your sample tubing to the barb fitting of the Vapor Pin® Sampling Device. Create a connection by using a short piece of flexible tubing to join the Vapor Pin® Sampling Device with the semi-rigid tubing. Put the semi-rigid tubing as close to the Vapor Pin® Sampling Device as possible to minimize contact between soil gas and flexible tubing.
7. Assign sample identification to the Summa® canister identification tag and record on chain of custody (COC), and the Summa Canister Sampling Field Data Sheet. Also record the Summa® canister's serial number on the Summa Canister Sampling Field Data Sheet.
8. Remove brass plug from canister fitting.
9. Attach a pre-calibrated/certified 24-hour flow controller, and particulate filter to the Summa® canister. Record the regulator serial number on the Summa Canister Sampling Field Data Sheet.
10. Attach the sample tube to the Summa® canister using a ¼-inch Swagelok® nut with appropriate ferrules, via the flow controller/particulate filter assembly.
11. Open canister valve to initiate sample collection and record sample start time, date and initial vacuum on the canister identification tag and on the Summa Canister Sampling Field Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use. Take a digital photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID and date.
12. After 24 hours, record sample end time and canister pressure on the Summa Canister Sampling Field Data Sheet, and close valve.
13. Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with brass plug.
14. Seal the hole in the basement slab with hydraulic cement patch.
15. Ship samples with COCs, overnight, to a NYSDOH approved laboratory, for analysis.

Using Helium Tracer Gas to Test Floor Seals.

1. Drill the concrete floor and attach and seal the Teflon sample tubing to the floor as described above.
2. Place a 2-quart (or similar size) bucket over the floor seal after threading the Teflon sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay.
3. The bucket should also have a hole in the top for the injection of helium gas. An additional hole should be present in the side, near the bottom, to measure the concentration of helium gas in the bucket.
4. Connect helium (99.999%) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe to the bottom port of the bucket.
5. Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.
6. Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Analyze the Tedlar bag for helium using a helium detector and record the results on the Summa Canister Sampling Field Data Sheet. Also analyze the Tedlar bag for the presence of methane, H2S, CO2 and O2 and record the result on the Summa Canister Sampling Field Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample tubing to the basement floor. The tubing must be resealed to the floor and another helium test conducted.
7. Purging flow rates must not exceed 0.2 L/min.
8. After purging, remove the bucket enclosure and assign sample identification to the Summa® canister identification tag and record on the COC, and the Summa Canister Sampling Field Data Sheet. Also record the Summa® canister's serial number on the Summa Canister Sampling Field Data Sheet.
9. Connect the 1/4-inch Teflon OD sample tubing to the Summa® canister regulator inlet using a ¼-inch Swagelok® nut with appropriate ferrules. Open the canister valve to initiate sample collection and record the start time and date and beginning vacuum on the canister identification tag and on the Summa Canister Sampling Field Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use.
10. After 24 hours, record sample end time and final vacuum on the Summa Canister Sampling Field Data Sheet and close the valve.
11. Disconnect the Teflon tubing from the Summa® canister and remove the flow controller/particulate-filter assembly from canister. Seal canister with brass plug.
12. Thread the Teflon sample tubing through the bucket enclosure and conduct a helium tracer gas test as described above. After purging, test the concentration of helium in the 1-liter Tedlar bag and record on the Summa Canister Sampling Field Data Sheet.
13. Remove the sample tubing, stopper and clay from the hole in the basement slab and seal with hydraulic cement patch.
14. Ship the samples, with COCs, overnight to a selected lab, for analysis.

During the sampling, the initial and final vacuum readings of each canister will be noted in a Field Form. In addition, smoke tubes will be used during the sub-slab sampling to confirm pressure relationships and airflow patterns, especially between floor levels and sub-slab. Upon completion of

the sample collection and screening steps, each penetration hole advanced through the slab will be patched with cement or will be repaired to restore pre-sampling conditions.

6.4.3 Indoor and Outdoor Air Sampling

Indoor air samples are proposed to be collected within the office on the first floor of each of the structure. In addition, an outdoor ambient air sample will be collected concurrently with the indoor air samples to determine the extent to which outdoor sources may be influencing indoor air quality within the sampling area.

Air sample locations have been determined in coordination with NYSDEC and NYSDOH during the onsite meeting held on October 7, 2025. Proposed sub-slab vapor sample and air sample locations can be found on Figure 3.

As specified in the SVI Guidance (NYSDOH, 2006), to reduce the potential for interference and dilution effects, the occupants of the buildings to be sampled will be requested to refrain from the activities listed below for the 24-hour period prior to and during the ambient air sampling collection:

- Opening any windows, fireplace dampers, openings or vents;
- Operating any ventilation fans unless special arrangements are made;
- Smoking in the building;
- Painting;
- Using a wood stove, fireplace, or other auxiliary heating equipment (e.g., kerosene heater);
- Operating or storing an automobile in the building or an attached garage;
- Allowing containers of gasoline or oil to remain within the building or garage area, except for fuel oil tanks;
- Cleaning, waxing or polishing furniture, floors or other woodwork with petroleum or oil-based products;
- Using air fresheners, scented candles or odor eliminators;
- Engaging in any hobbies that use materials containing volatile chemicals;
- Using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;
- Lawn mowing, paving with asphalt, or snow blowing;
- Applying pesticides; and,
- Using building repair or maintenance products, such as caulk or roofing tar.

Indoor air and outdoor air samples will be collected concurrently with the sub-slab soil vapor sampling.

Sampling procedures for the indoor samples and outdoor air sample are summarized below:

1. Place the basement and first floor Summa® canisters at breathing height in a high traffic location. The breathing height is defined as three to six feet above the floor. Place the outdoor air sample at least 2 to three feet above the ground.
2. Record the canister's serial number on the Summa Canister Sampling Field Data Sheet.
3. Assign sample identification to the canister identification tag (see Section 10.3.1 below) and record on the COC and the Summa Canister Sampling Field Data Sheet.
4. Remove brass plug from canister fitting.

5. Attach a pre-calibrated/certified 24-hour flow controller and particulate filter to the Summa® canister, open valve completely to initiate sampling, and record the sample start time and date, and beginning vacuum reading on the canister identification tag and the Summa Canister Sampling Field Data Sheet. Also record the regulator serial number on the Summa Canister Sampling Field Data Sheet. If the canister does not show sufficient vacuum (generally less than 25" Hg), do not use.
6. Take a digital photograph of canister setup and surrounding area. Include a dry erase board or similar display which presents sample ID and date.
7. After 24 hours, record end time and pressure on the Summa Canister Sampling Field Data Sheet, and close valve.
8. Disconnect flow controller/particulate filter assembly from canister.
9. Seal canister with brass plug.
10. Ship canister standard overnight, with COC, to a NYSDOH approved laboratory, for analysis.

6.4.4 Site Restoration

If necessary, upon completion of soil vapor or sub-slab soil vapor sampling, an AECOM subcontractor will repair the carpet/floor tile to restore the work area to its previous conditions. The nature and extent of site restoration that will be required upon completion of the SVI sampling will be determined on a case-by-case basis.

6.4.5 Soil Vapor Sample Analytical Requirements

AECOM will use a NYSDOH Wadsworth Environmental Laboratory Accreditation Program (ELAP) laboratory certified for the air and emissions category. The Summa® canisters will be certified clean (batch certification) by the laboratory. Air samples are typically analyzed for VOCs by USEPA Method TO-15.

For indoor air samples and outdoor air samples, the required detection limit for trichloroethene (TCE), carbon tetrachloride, and vinyl chloride (the three “Matrix 1” compounds) is 0.25 micrograms per cubic meter (µg/m^3). For the remaining compounds, the reporting limit will be 1.0 µg/m^3 (sub-slab soil vapor, indoor air and outdoor air samples). The laboratory-specific detection limits and quantitation limits for TO-15 analytes will included in as an attachment to the site-specific Work Plan or in the site-specific QAPP.

6.4.6 Decontamination Procedures

Only dedicated equipment (canisters, tubing, etc.) will be used during sampling. All non-dedicated equipment (i.e. flow meters, etc.) will be purged with air prior to sampling. As such, no field decontamination is necessary for air sampling. Summa canisters will be decontaminated by the analytical laboratory and certification of cleanliness will be included in the analytical data report.

7. Decontamination and Management of Investigation Derived Waste

7.1 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 the site-specific FAP. Field equipment rinsate blanks are generated and analyzed to monitor the effective of field decontamination procedures.

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

When sampling for PFAS, see Appendix A for special field procedures.

7.1.1 Decontamination Procedures

A decontamination pad will be constructed on the site by AECOM's drilling subcontractor, Nothnagle Drilling.

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

7.1.2 Small Equipment Decontamination

Small equipment decontamination for non-disposable equipment will be accomplished using the following procedures:

- Liquinox® (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. Liquinox®) 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.

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.

Electric submersible pumps (such as a Grundfos Redi-Flow II) will be decontaminated using the above steps followed by running a large volume (several gallons) of potable water through the pump, followed by an analyte-free water rinse. Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a plastic bucket filled with Liquinox and potable water and then run for several minutes (to decontaminate both exterior and interior parts). The process will be repeated with potable water. Submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each used. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced

after each use. Dedicated airline tubing and high-density polyethylene (HDPE) sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Liquinox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

7.1.3 Heavy Equipment Decontamination

Drilling equipment will be decontaminated before the first use, between boreholes and prior to demobilization using high-pressure steam. Decontamination will be conducted at a dedicated decontamination pad constructed for the project or at an alternate location as indicated in the site-specific Work Plan or site-specific FAP. Decontamination fluids will be containerized (drummed) for subsequent characterization or disposal.

7.1.4 Personnel Decontamination

Wash buckets and potable water will be set up at the decontamination pad or alternate location as indicated in the site-specific Work Plan, site-specific FAP, or HASP. This includes washing hands and a boot wash. Details of the personnel decontamination procedures will be provided in the HASP.

7.2 Management of Investigation Derived Waste

Investigation-derived waste (IDW) management will be in accordance with section 3.3(3e) 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.

IDW generated during field activities include, but is not limited to, the following:

- Purge water;
- Poly sheeting;
- PPE; and
- Drill cutting and soil boring spoils.

This IDW must be placed in 1A2 open head 55-gallon steel drums pending shipment off site for disposal.

Procedure:

Segregation

- Drummed IDW is to be divided into the following categories:
  - Drill cuttings and soil boring spoils (see Section 3.0);
  - Purgewater from monitoring well development/sampling and DNAPL/LNAPL product; and,
  - Solid waste other than drill cuttings and boring spoils (i.e., spent poly tubing, PPE, etc.).

Generator ID

- Any IDW generated is assigned USEPA Generator ID Number TBD.

Hazardous/Non-Hazardous Classification

- AECOM will collect characterization samples to classify the IDW as either hazardous or non-hazardous.

Shipment/Disposal

- Drummed IDW must be staged at its point of origin until it is shipped off site on the same day it is generated or staged in a designated and secured area until it can be shipped off site at a later date.
- All IDW must be shipped off site by a permitted contractor to a permitted facility and may be disposed of at a facility licensed to accept hazardous waste, if necessary.

Manifests

- Waste manifests must accompany the IDW during shipment off site for disposal. For non-hazardous waste, a non-hazardous waste manifest must be completed. For hazardous waste, a Uniform Hazardous Waste Manifest (USEPA Form 8700-22) must be completed, along with a Land Disposal Restriction Notification Form 1. IDW manifests can be signed by AECOM personnel as agents for the generator (NYSDEC).

8. Community Air Monitoring Program

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 CAMP (May, 2010; Appendix 1A to DER-10 [NYSDEC, 2010]) which is typically utilized by NYSDEC as guidance for work conducted under these contracts.

8.1 Monitoring

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter and surrounding community of the work area may be necessary. 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 will be determined by NYSDEC and AECOM and specified in the site-specific Work Plan and site-specific FAP.

8.1.1 Continuous Air Monitoring

Continuous monitoring for VOCs and particulates may be required for ground intrusive activities associated with the site, including, but not limited to, hand digs, the installation of soil borings and groundwater monitoring wells. A total of two (2) CAMP units will be present; one (1) in a down-wind location and one (1) in an up-wind location.

VOC monitoring will be conducted at the downwind perimeter of the immediate work area on a continuous basis. VOC monitoring will be performed using a MiniRAE 2000 or equivalent, which is appropriate to detect a wide range of contaminants typically encountered. The MiniRAE 2000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 2000 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 Thermo MIE pDR-4000 DataRam or equivalent. The Thermo MIE pDR-4000 DataRam 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. The Thermo MIE pDR is equipped with an audible alarm to indicate exceedance of the action level. In addition to using the Thermo MIE pDR-4000 DataRam, 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.

8.1.2 Periodic (As-Needed) Air Monitoring

Periodic or as-needed air monitoring for VOCs may be required during non-intrusive activities associated with the site-specific Work Plan. Non-intrusive activities may include the collection of soil

samples and the collection of groundwater samples from existing monitoring wells. Periodic air monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

8.1.3 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.

8.1.4 Volatile Organic Compounds

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (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. Additionally, daily reporting of the CAMP data for VOCs will be provided to NYSDEC and NYSDOH including CAMP monitoring station location sketches.

8.1.5 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 included in daily reports for NYSDEC and NYSDOH personnel to review, including CAMP monitoring station location sketches.

9. 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 Log Books and Standard Forms. Standard Forms are provided in Appendix B.

9.1 Field Log Books

Field log books will be prepared and maintained throughout the course of the investigation. With the exception of PFAS sampling events (Appendix A), only bound, weatherproof field log books will be used by personnel working on NYSDEC projects. The log books will be turned in for copying/filing/tracking when complete. If performing PFAS sampling, then loose leaf notebook paper shall be used in lieu of a field log book.

Each log book will be labeled on the front cover in indelible ink with the following designation: “6 Old River Road/Site Characterization,” NYSDEC Work Assignment D009803-60, AECOM Project Number 607770465.”

Entries will be recorded in indelible, waterproof ink. If errors are made in any field log book, field record (form), Chain-of-Custody Record, 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 this FAP to facilitate the collection of consistent data (see Appendix B). This will preclude detailed documentation of, for example, lithologic descriptions in the field log book. A reference, however, to use of each specific form must be made in the log book.

The date will be placed at the top of every page in the left-hand corner of the right page. The time of entry recordings will be in columnar form down the left-hand side of the right page. If an entry is made in a non-dedicated log book, then the date, project name, and project number will be entered left to right, respectively, along the top of the right 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 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 on notebook loose leaf paper. The sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements will be identified in the field log books. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment will also be recorded, 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. Notes will be updated as field work progresses.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the pages that were filled out during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

The field notes will be submitted to the AECOM project manager for final cataloging and filing. The field notes will be stored in the Project File. Copies of specific sections will be made available to personnel upon request.

9.2 Standard Forms

All non-bound field records (e.g., drilling logs, well construction forms, sampling logs, etc.) 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 CDs, and/or uploaded 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. Examples of forms typically used are provided in Appendix B of this FAP.

On a periodic basis (i.e., daily, weekly, etc.), or at the end of each field event, the field forms that were completed during that time will be scanned into PDF format. The resulting PDF files will then be uploaded to the project folder located on the office server.

9.3 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
SW	Surface water
SD	Sediment
IA	Indoor air
OA (or AA)	Outdoor (or ambient) air
SV	Soil vapor
FB	Field (Rinsate) Blank
N + 50	Field Duplicate (e.g., field duplicate of MW-3S will be MW-53S)
TB	Trip Blank
MS/MSD	Matrix Spike/ Matrix Spike Duplicate

Field blanks and tip 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
MW-101D	Deep monitoring well MW-101D

SB-02-0406	Soil sample from 4 to 6 ft interval from boring SB-02.
SS-01	Surface soil sample from location SS-01.
FBW110502	Field blank associated with water samples collected on 5/2/11
TB110503	Trip blank associated with samples shipped 5/3/11.

9.4 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.

9.5 Sample Shipping

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures should follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1. The chain-of-custody (COC) record (Appendix B) should be completely filled out, with all relevant information.
2. The original COC goes with the samples. It should be placed in a Ziploc bag and taped inside the sample cooler. The sampler should retain a copy of the COC.
3. Place inert cushioning material such as vermiculite or bubble-wrap in the bottom of the cooler.
4. Place the bottles in the cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).
5. Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.
6. With the exception of Summa® canisters, pack the cooler with ice in doubled Ziploc plastic bags.
7. Pack the cooler with cushioning material.
8. Tape the drain shut.
9. Wrap the cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

10. Place the lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.
11. Summa® canisters are shipped in the same boxes the laboratory used for shipping.
12. Ship samples via overnight carrier the same day that they are collected. Samples (except Summa® canisters) must be maintained at 4 degrees Celsius (C) ± 2ºC throughout the shipping duration.

10. References

American Society for Testing and Materials (ASTM) D1452/D1452M-16, *Standard Practice for Soil Exploration and Sampling by Auger Borings*

ASTM D1586/ D1586M-18. *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*.

ASTM D2487-17. *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*.

ASTM D2488-17. *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*.

ASTM D4750-87(2001). *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*.

ASTM D5092/D5092M-16. *Standard Practice for Design and Installation of Groundwater Monitoring Wells*.

NYSDEC, 2011. DER-31 / *Green Remediation*, Issued August 11, 2010.

NYSDEC, 2010. DER-10 Technical Guidance for Site Investigation and Remediation. May 3, 2010.

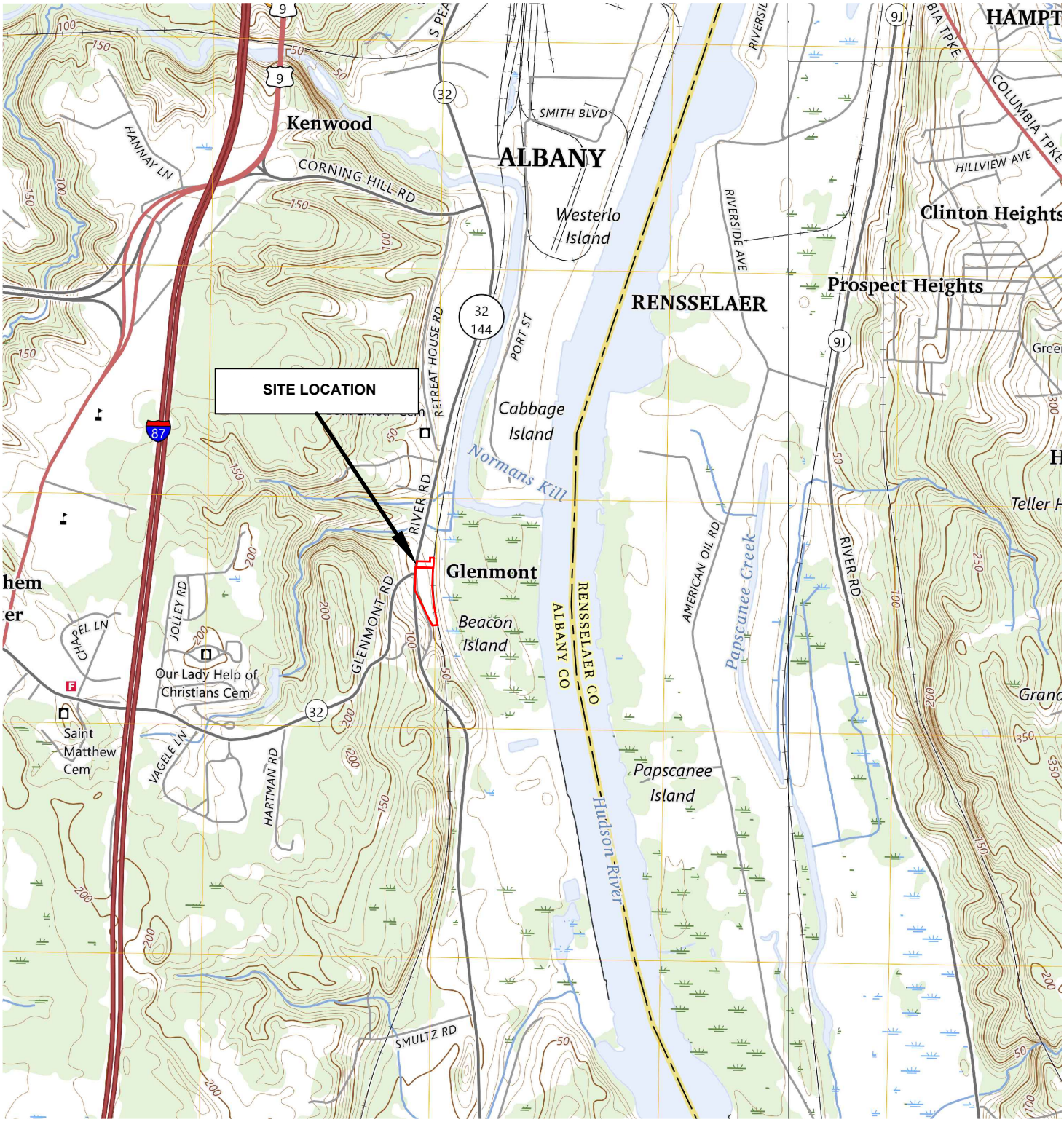
United States Environmental Protection Agency (USEPA), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. USEPA Office of Emergency and Remedial Response. EPA/540/G-89/004. October.

USEPA, 1998. Region II Sampling SOP - Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16, 1998.

USEPA, 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. OSWER. Douglas Yeskis and Bernard Zavala. EPA 542-S-02-001. May 2002.

USEPA, 2016. *Green Remediation Best Management Practices: Site Investigation and Environmental Monitoring.* Office of Land and Emergency Management EPA 542-F-16-002. September.

Figures



0 2000 4000

APPROXIMATE SCALE IN FEET
SCALE= 1:24000



BASEMAP SOURCES:

USGS 7.5-minute Series Topographic Map 2023
Albany, NY Quadrangle, Albany Co. New York
Delmar, NY Quadrangle, Albany Co. New York
East Greenbush, NY Quadrangle, Rensselaer Co. New York
Troy South, NY Quadrangle, Rensselaer Co. New York

Title:	SITE LOCATION MAP
Location:	6 OLD RIVER ROAD GLENMONT NEW YORK 12077 SITE ID: 401088
Client:	NYSDEC

AECOM

Drafter: CLS	Date: October 2025
Drg. Size: 8.5 x 11	Job No.: 60770465

FIGURE 1

D:\6 Old River Road, Glenmont, NY\Figure 1\Figure 1 Site Location Glenmont October 2025.dwg User: carrie.szczepanski Oct 09, 2025 - 12:30pm



LEGEND

- DRINKING WATER WELL LOCATION (APPROXIMATE)
- PROPOSED BORING/MONITORING WELL LOCATION (APPROXIMATE)
- SEPTIC TANK AND LEACH FIELD (APPROXIMATE) LOCATION
- ST — STORMWATER SYSTEM

BASEMAP SOURCES:
ORTHOIMAGERY ACCESSED FROM GIS.NY.GOV ORTHOIMAGERY CLEARINGHOUSE. ORTHOIMAGERY DATED 2024.

0 50' 100'

1" = 80'

6 OLD RIVER ROAD NYSDEC SITE ID: 401088
6 OLD RIVER ROAD
Glenmont, New York
Project No.: 60770465 Date: 2025-12-16

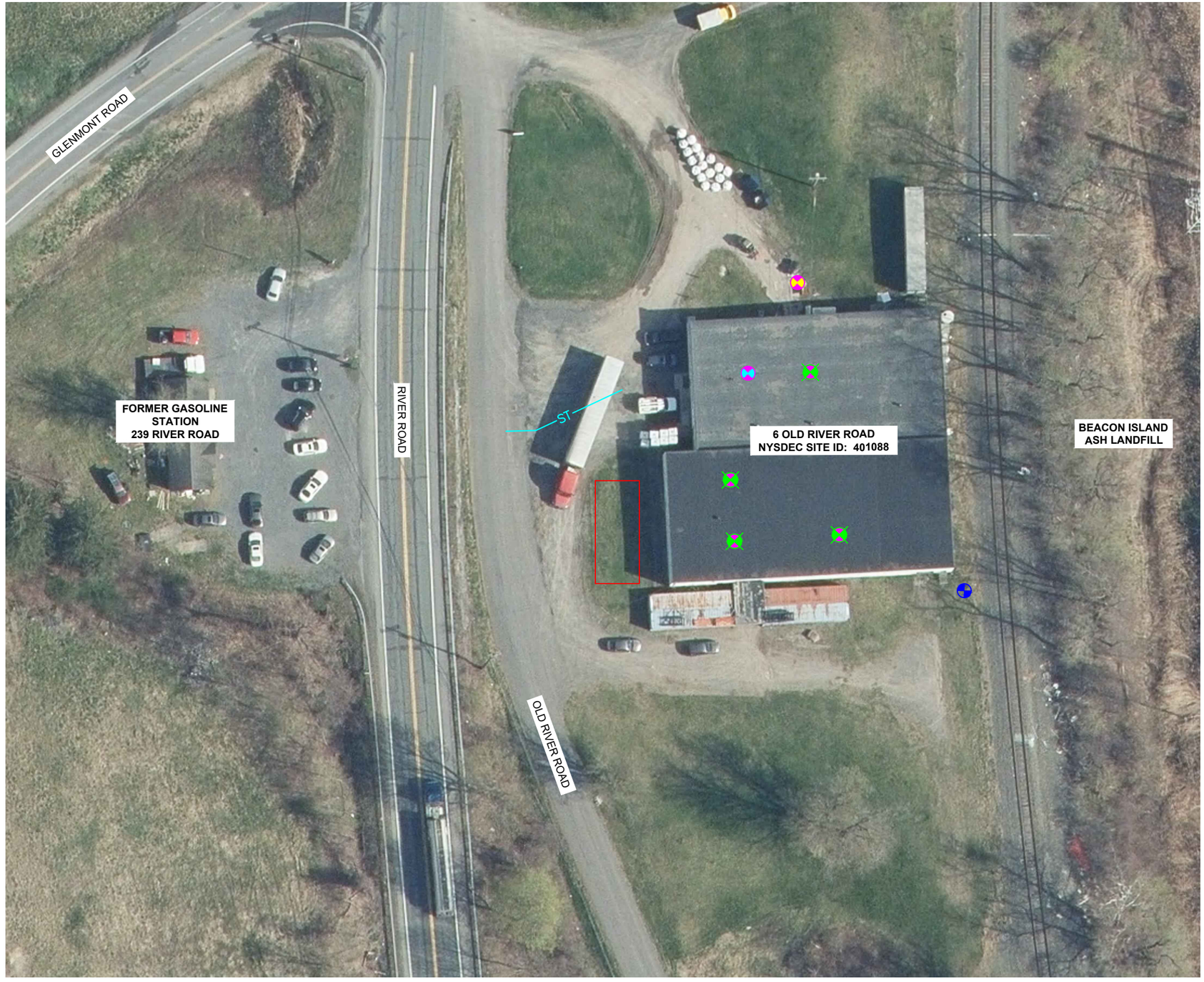
PROPOSED BORING AND MONITORING WELL LOCATION PLAN

AECOM

Figure: 2

Last saved by: CARRIE.SZCZEPANSKI(2025-12-16) Last Plotted: 2025-12-16
Filename: D:\6 OLD RIVER ROAD, GLENMONT, NY\FIGURE 3\WORKING-DWG_DEC_2025.DWG

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



LEGEND

- DRINKING WATER WELL LOCATION (APPROXIMATE)
- PROPOSED SOIL VAPOR SAMPLE AND CO-LOCATED AMBIENT AIR SAMPLE LOCATION
- INDOOR AMBIENT AIR SAMPLE OFFICE ABOVE CRAWL SPACE (APPROXIMATE)
- OUTDOOR AMBIENT AIR SAMPLE BACKGROUND (APPROXIMATE)
- SEPTIC TANK AND LEACH FIELD (APPROXIMATE) LOCATION
- ST — STORMWATER SYSTEM

BASEMAP SOURCES:
ORTHOIMAGERY ACCESSED FROM GIS.NY.GOV ORTHOIMAGERY CLEARINGHOUSE. ORTHOIMAGERY DATED 2024.

0 50' 100'

1" = 80'

6 OLD RIVER ROAD NYSDEC SITE ID: 401088
6 OLD RIVER ROAD
Glenmont, New York
Project No.: 60770465 Date: 2025-12-16

PROPOSED VAPOR AND AIR SAMPLING LOCATION PLAN

AECOM

Figure: 3

Tables

Table 1
Soil Boring Overview
Field Activities Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

Boring ID	Boring Type	Location	Purpose	Depth (ft)
SB-01	Hollow Stem Auger	Off the northeast corner of building	Collection of Soil Samples/Conversion to Monitoring Well	25*
SB-02	Hollow Stem Auger	Off the west side of building; near septic system	Collection of Soil Samples/Conversion to Monitoring Well	25*
SB-03	Hollow Stem Auger	Off the southeast corner of building; near supply well	Collection of Soil Samples/Conversion to Monitoring Well	25*
SB-04	Hollow Stem Auger	Near southwest corner of building	Collection of Soil Samples/Conversion to Monitoring Well	25*

Notes:
*Depth is estimated

Table 2
Monitoring Well Sampling Plan
Field Activities Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

AECOM

Monitoring Well ID	Analytes								
	VOCs (8260D)	SVOCs (including 1,4-dioxane) (8270D/8270 SIM)	Metals (6010C)	Mercury (7470A)	Cyanide (9010)	PCBs (8082A)	Herbicides (8151A)	Pesticides (8081B)	PFAS (1633A)
MW-01	X	X	X	X	X	X	X	X	X
MW-02	X	X	X	X	X	X	X	X	X
MW-03	X	X	X	X	X	X	X	X	X
MW-04	X	X	X	X	X	X	X	X	X
On Site Supply Well	X	X	X	X	X	X	X	X	X

Appendix A (of the FAP) NYSDEC PFAS Sampling and Analysis Guidance

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

Appendix B (of the FAP) Field Activity Forms

AECOM, Inc.
40 British American Boulevard
Latham, New York 12110
Phone: (518) 951-2200
Fax: (518) 951-2300

BOREHOLE LOG

BORING ID #:

START DATE: END DATE:

PROJECT NAME: **National Transit Pump Station** PROJECT NO.: 60715865 PROJECT MANAGER: Robert Forstner
SITE LOCATION: **Hancock, NY** BORING LOCATION:
DRILLING CO.: Summit Drilling LLC DRILLER: DRILLING METHOD:
BOREHOLE DIAMETER: DEPTH TO BEDROCK: TOTAL DEPTH DRILLED:
TOTAL DEPTH REACHED: INSPECTOR: WEATHER CONDITIONS:
LATITUDE: LONGITUDE: ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:
							WEIGHT(S)						
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE	WATER LEVEL ---------- REMARKS
0.0													
2.0													
4.0													
6.0													
8.0													
10.0													
12.0													
14.0													
16.0													
18.0													
20.0													Page of

AECOM, Inc.
40 British American Boulevard
Latham, New York 12110
Phone: (518) 951-2200
Fax: (518) 951-2300

BOREHOLE LOG

BORING ID #:

START DATE: END DATE:

PROJECT NAME: **National Transit Pump Station** PROJECT NO.: 60715865 PROJECT MANAGER: Robert Forstner
SITE LOCATION: **Hancock, NY** BORING LOCATION:
DRILLING CO.: Summit Drilling LLC DRILLER: DRILLING METHOD:
BOREHOLE DIAMETER: DEPTH TO BEDROCK: TOTAL DEPTH DRILLED:
TOTAL DEPTH REACHED: INSPECTOR: WEATHER CONDITIONS:
LATITUDE: LONGITUDE: ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1: DATE 2:	DEPTH 1: DEPTH 2:	TIME 1: TIME 2:
							WEIGHT(S)						
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE	WATER LEVEL ---------- REMARKS
20.0													
22.0													
24.0													
26.0													
28.0													
30.0													
32.0													
34.0													
36.0													
38.0													
40.0													Page of

WELL CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: _____

DRILLING CONTRACTOR: _____

DRILLING TECHNIQUE: _____
SIZE AND TYPE: _____

BOREHOLE IDENTIFICATION: _____
BOREHOLE DIAMETER: _____
WELL IDENTIFICATION: _____

WELL CONSTRUCTION START DATE: _____
WELL CONSTRUCTION COMPLETION DATE: _____
SCREEN MATERIAL: _____
SCREEN DIAMETER: _____
SCREENED INTERVAL (ft.): _____

RISER MATERIAL: _____
RISER DIAMETER: _____

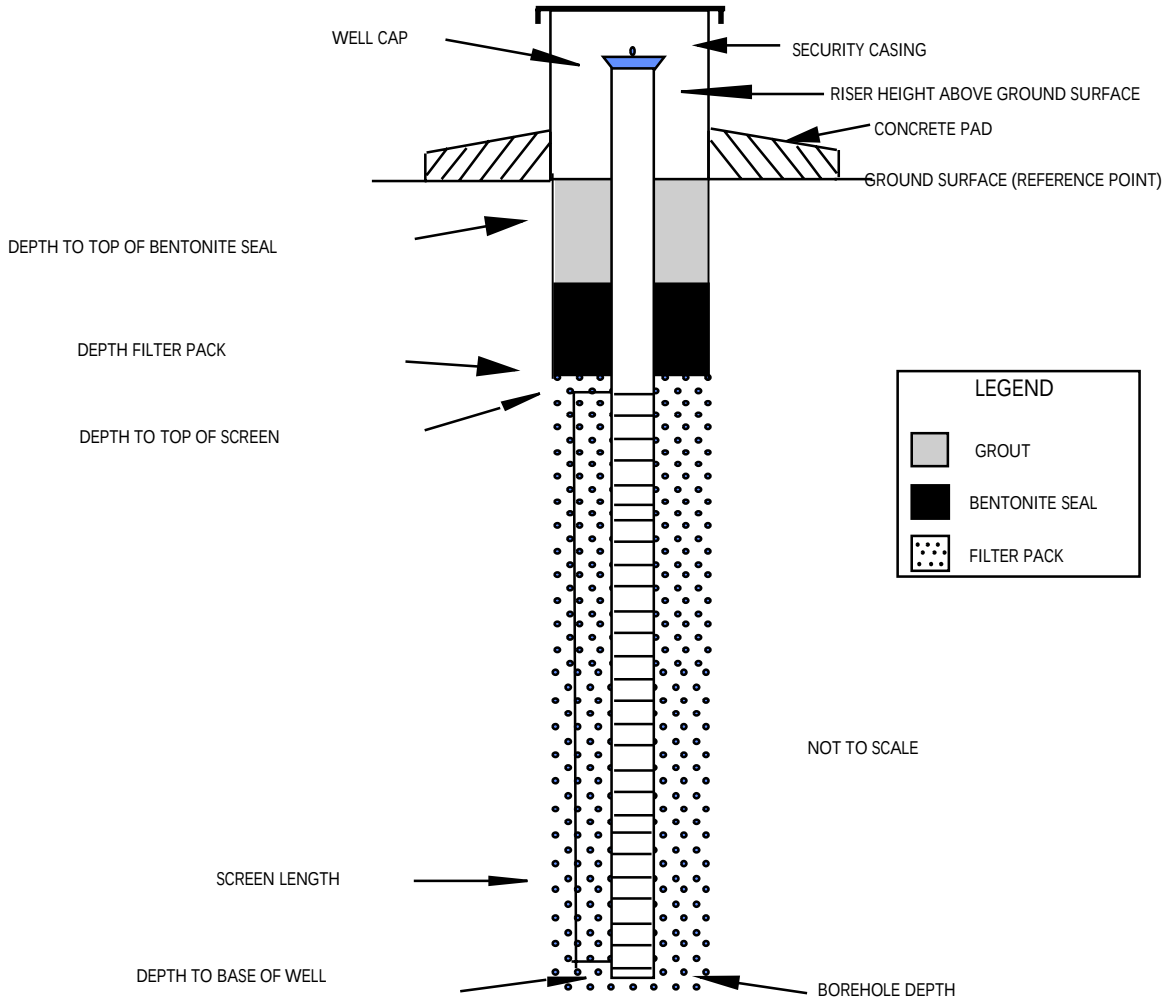
TYPE OF FILTER PACK: _____
GRADATION: _____
AMOUNT OF FILTER PACK USED: _____

TYPE OF BENTONITE: _____
AMOUNT OF BENTONITE: _____

TYPE OF CEMENT: _____
AMOUNT CEMENT USED: _____
GROUT MATERIALS USED: _____

DIMENSIONS OF SECURITY CASING: _____
TYPE OF WELL CAP: _____
TYPE OF END CAP: _____
COMMENTS: _____

CASING MATERIAL: _____
DEPTH OF CASING: _____



●AECOM ● 40 British American Blvd. Latham, NY 12110

Monitoring Well Purging/Sampling Form

Project Name and Number: _____

Monitoring Well Number: _____ Date: _____

Samplers: _____

Sample Number: _____ QA/QC Collected? _____

Purging / Sampling Method: _____

1. L = Total Well Depth: _____ feet
2. D = Riser Diameter (I.D.): _____ feet
3. W = Static Depth to Water (TOC): _____ feet
4. C = Column of Water in Casing: _____ feet
5. V = Volume of Water in Well = $C(3.14159)(0.5D)^2(7.48)$ _____ gal
6. D2 = Pump Setting Depth (ft): _____ feet
7. C2 = Column of water in Pump/Tubing (ft): _____ feet
8. Tubing Volume = C2(0.005737088) _____ gal

D (inches)	D (feet)
1-inch	0.08
1.5-inch	0.125
2-inch	0.17
3-inch	0.25
4-inch	0.33
6-inch	0.50

Conversion factors to determine V given C

D (inches)	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch
V (gal / ft)	0.041	0.092	0.163	0.37	0.65	1.5

Water Quality Readings Collected Using _____

Parameter	**Units**	**Readings**						
Time	24 hr							
Water Level (0.33)	feet							
Volume Purged	gal							
Flow Rate	mL / min							
Turbidity (+/- 10%)	NTU							
Dissolved Oxygen (+/- 10%)	%							
Dissolved Oxygen (+/- 10%)	mg/L							
Eh / ORP (+/- 10)	MeV							
Specific Conductivity	mS/cm^c							
Conductivity (+/- 3%)	mS/cm							
pH (+/- 0.1)	pH unit							
Temp (+/- 0.5)	C							
Color	Visual							
Odor	Olfactory							

Comments

Purge Start Time:

Sample Time:

* Three consecutive readings within range indicates stabilization of that parameter.

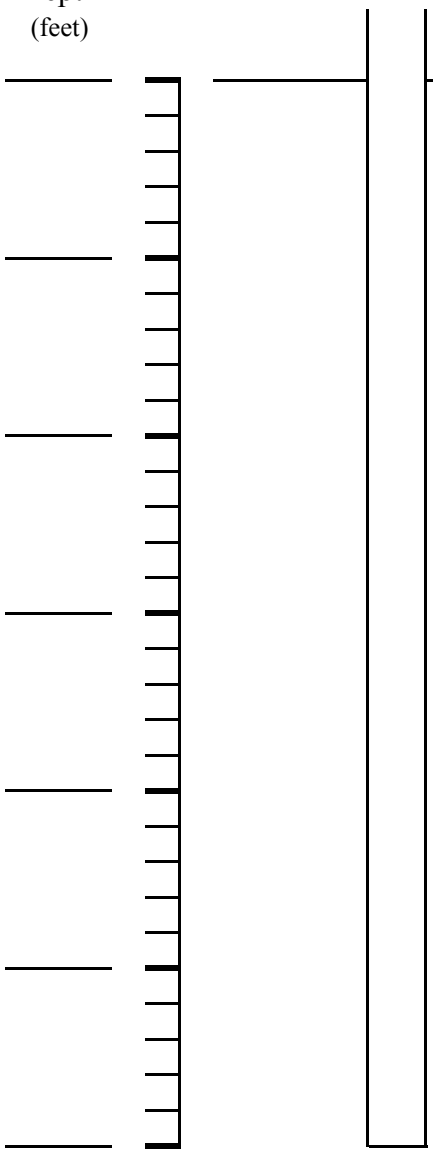
WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	
# of batches prepared	
For each batch record:	
Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

CHAIN OF CUSTODY RECORD

AECOM

PROJECT NO. | SITE NAME

SAMPLERS (PRINT/SIGNATURE)

LAB _____

COOLER _____ of _____

PAGE _____ of _____

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO. # OF CONTAINERS	TESTS / BOTTLE TYPE AND PRESERVATIVE	REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	FIELD LOT NO.# (IRPIMS ONLY)

MATRIX CODES

AA - AMBIENT AIR; SE - SEDIMENT; SH - HAZARDOUS SOLID WASTE; SL - SLUDGE; WP - DRINKING WATER; WW - WASTE WATER; WG - GROUND WATER; SO - SOIL; DC - DRILL CUTTINGS; WL - LEACHATE; GS - SOIL GAS; WC - DRILLING WATER; WO - OCEAN WATER; WS - SURFACE WATER; WQ - WATER FIELD QC; LH - HAZARDOUS LIQUID WASTE; LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK; SD# - MATRIX SPIKE DUPLICATE; RB# - RINSE BLANK; FR# - FIELD REPLICATE; N# - NORMAL ENVIRONMENTAL SAMPLE; MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME

SPECIAL INSTRUCTIONS

Distribution: Original accompanies shipment, copy to coordinator field files

AIR SAMPLE
CHAIN OF CUSTODY RECORD

AECOM CONTACT: _____

PROJECT NUMBER	SITE NAME
SAMPLERS (PRINT/SIGNATURE)	

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LAB _____

SHIPPING CONTAINER _____ of _____

PAGE _____ of _____

LOCATION IDENTIFIER	SAMPLE DATE	SAMPLE TIME	SAMPLE ID	MATRIX CODE	CANISTER SIZE (LITERS)	SAMPLE INFORMATION: CANISTER ID	FLOW CONTROLLER ID	INITIAL PRESSURE/ VACUUM (" Hg)	FINAL PRESSURE/ VACUUM (" Hg)	PRESSURE/VACUUM UPON LAB RECEIPT (" Hg)	REQUIRED ANALYSIS			REMARKS	SAMPLE TYPE CODE

MATRIX CODES	AA - AMBIENT AIR	AI - INDOOR AIR	AQ - FIELD QC	AS - SUB-SLAB AIR	GS - SOIL GAS
SAMPLE TYPE CODES	N# - NORMAL ENVIRONMENTAL SAMPLE	FD# - FIELD DUPLICATE	MS# - MATRIX SPIKE	(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)	

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME	

Distribution: Original accompanies shipment, copy to project file

Appendix C (of the FAP) Vapor Pin Procedures

Standard Operating Procedure

Drilling Guide & Secure Cover

Scope & Purpose

Scope

This standard operating procedure (SOP) describes the methodology to use the Vapor Pin® Sampling Device Drilling Guide and Secure Cover to install and secure a Vapor Pin® Sampling Device in a flush mount configuration.

Purpose

The purpose of this SOP is to detail the methodology for installing a Vapor Pin® Sampling Device and Secure Cover in a flush mount configuration. The flush mount configuration reduces the risk of damage to the Vapor Pin® Sampling Device by foot and vehicular traffic, keeps dust and debris from falling into the flush mount hole, and reduces the opportunity for tampering.

Equipment Needed

- Vapor Pin® Sampling Device Secure Cover (Figure 1)
- Vapor Pin® Sampling Device Drilling Guide (Figure 2)
- Rotary Hammer Drill
  - ⅝-Inch (16mm) diameter hammer bit
  - 1½-Inch (38mm) diameter hammer bit for flush mount applications
- Assembled Vapor Pin® Sampling Device
- #14 Spanner Wrench
- Wet/Dry vacuum with HEPA filter (optional)
- Personal Protective Equipment (PPE)



Figure 1

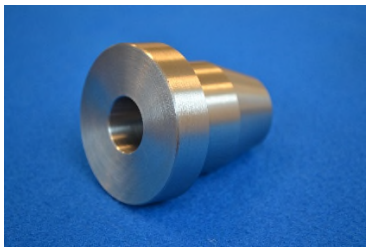


Figure 2

Installation Procedure

1. Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.
2. Set up wet/dry vacuum to collect drill cuttings.
3. While wearing PPE, drill a 1½-inch (38mm) diameter hole into the concrete slab to a depth of approximately 1¾-inches (45mm). Pre-marking the desired depth on the drill bit with tape will assist in this process.
4. Remove cuttings from the hole and place the Drilling Guide in the hole with the conical end down (Figure 3). The hole is sufficiently deep if the flange of the Drilling Guide lies flush with the surface of the slab. Deepen the hole as necessary but avoid drilling more than 2 inches (50.8mm) into the slab, as the threads on the Secure Cover may not engage properly with the threads on the Vapor Pin® Sampling Device.
5. When the 1½-inch (38mm) hole is drilled to the proper depth, replace the drill bit with a ⅝-inch (16mm) bit, insert the bit through the Drilling Guide (Figure 4), and drill through the slab. The Drilling Guide will help to center the hole for the Vapor Pin® Sampling Device and keep the hole perpendicular to the slab.
6. Remove the bit and drilling guide, clean the hole, and install the Vapor Pin® Sampling Device in accordance with the SOP “Installation and Extraction of the Vapor Pin® Sampling Device.”
7. Screw the Secure Cover onto the Vapor Pin® Sampling Device and tighten using a #14 Spanner Wrench by rotating it clockwise (Figure 5). Rotate the cover counterclockwise to remove it for subsequent access.

8. For flush mount installations, cover the Vapor Pin® with a flush mount cover, using either the plastic cover or the optional Stainless Steel Secure Cover (Figure 4).
9. Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.


Figure 3


Figure 4


Figure 5

Limitations

On slabs less than 3 inches thick, it may be difficult to obtain a good seal in a flush mount configuration with Vapor Pin® Sampling Device. But a perfect alternative for that would be our Mini Vapor Pin®!

Standard Operating Procedure

Leak Testing your Summa Canister Connections Via Mechanical Means (Hand Pump)

Scope & Purpose

Scope

This standard operating procedure (SOP) describes the methodology of testing your Hand Pump Set and using your Hand Pump Set to leak test your Summa canister connections.

Purpose

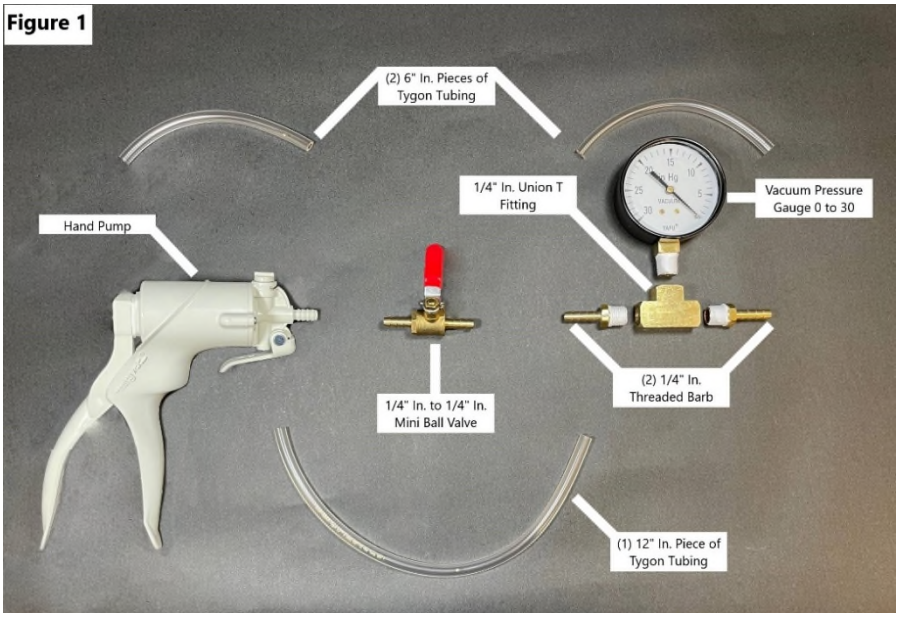
The purpose of this SOP is to detail the methodology for testing your Hand Pump Set and using it to leak test your Summa canister connections.

Equipment Needed

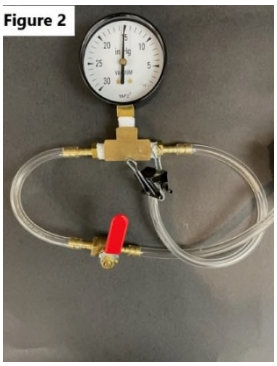
- ¼" In. Union T Fitting
- Hand Pump
- Vacuum Pressure Gauge
- (2) ¼" In. Threaded Barb
- ¼" In. to ¼" In. Mini Ball Valve
- Tygon Tubing
- Binder Clip

Testing your Hand Pump Set (HPSET)

1. In Figure 1 is everything included in the HPSET. The HPSET comes pre-assembled and leaked tested prior to shipping.

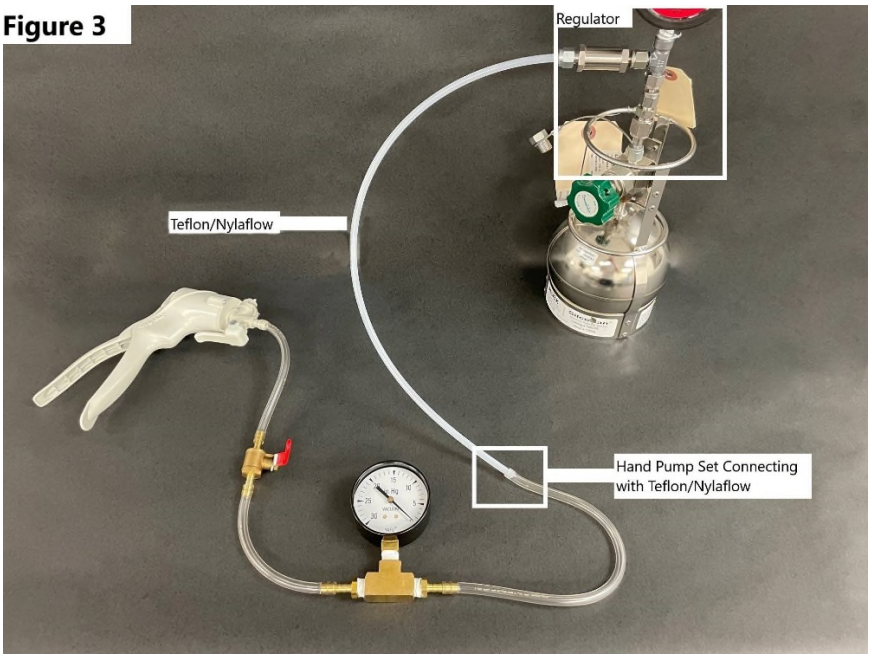


2. Fold over the end portion of your 12" In. piece of Tygon twice and pinch it using the provided binder clip. Proceed to use the hand pump to create a vacuum of approximately 15 In. Hg and close off the mini ball valve (Figure 2). A steady vacuum reading will verify if there are not any leaks in your Hand Pump Set.


Figure 2

Leak Test Procedure

1. Prepare your Summa cannister for leak testing by attaching your preferred hard tubing (i.e., Nylaflow or Teflon) to the regulator. Be sure to follow laboratory SOPs when making your attachment to the regulator. If the regulator uses compression-type fittings, use caution not to overtighten them, as this could result in warping the connection enough to produce a leak
2. Connect your Hand Pump Set with your hard tubing (Figure 3) and proceed to use the hand pump to create a vacuum of approximately 15 In. Hg and close off the mini ball valve. **NOTE:** During "closing" of the mini ball valve, there is exposure to your vacuum train, and the needle on your gauge may adjust slightly.



- If you cannot retain a vacuum, there is likely a leak at one of the Summa canister or regulator connections. In this event, consult with the laboratory or sales rep that you have procured your Summa canister from.

5. Once it is confirmed that your sample train has no leaks, cut off from the Hand Pump Set half an inch of Tygon from the connection point of the hard tubing. This is so that you may use the remaining half inch to connect to your Vapor Pin® Sampling Device.

Appendix D (of the FAP) NYSDOH Indoor Air Quality Questionnaire and Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

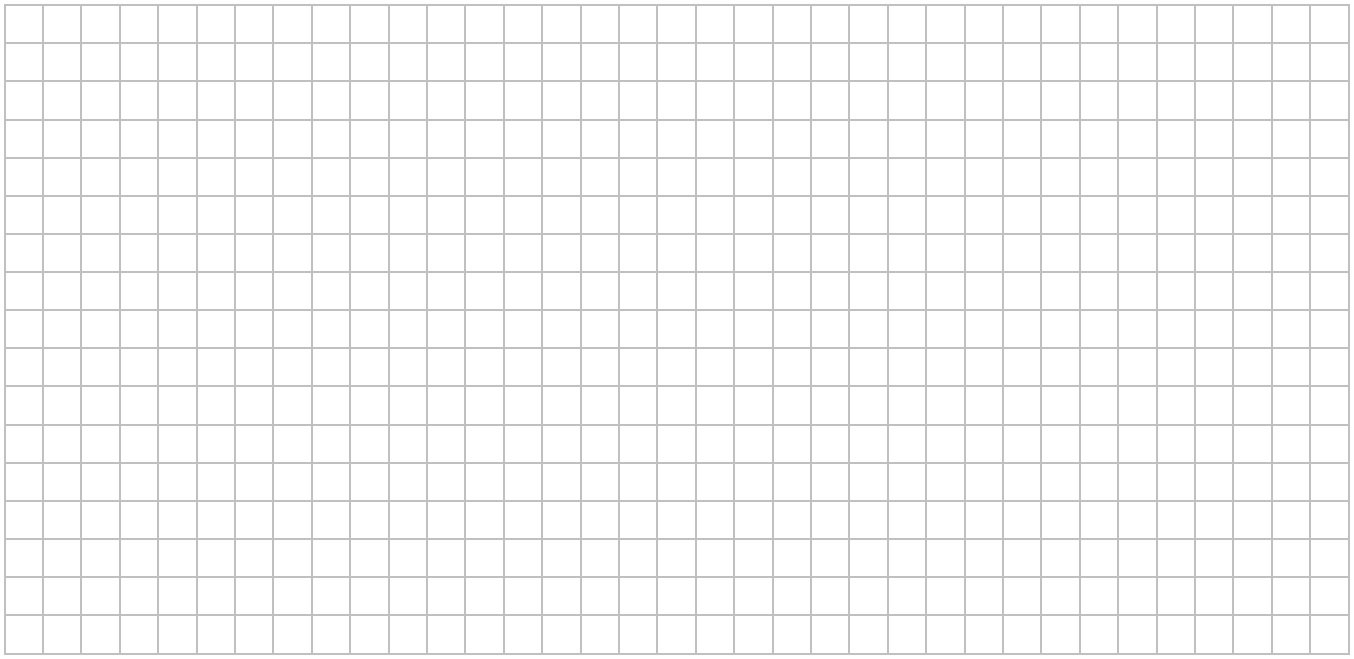
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

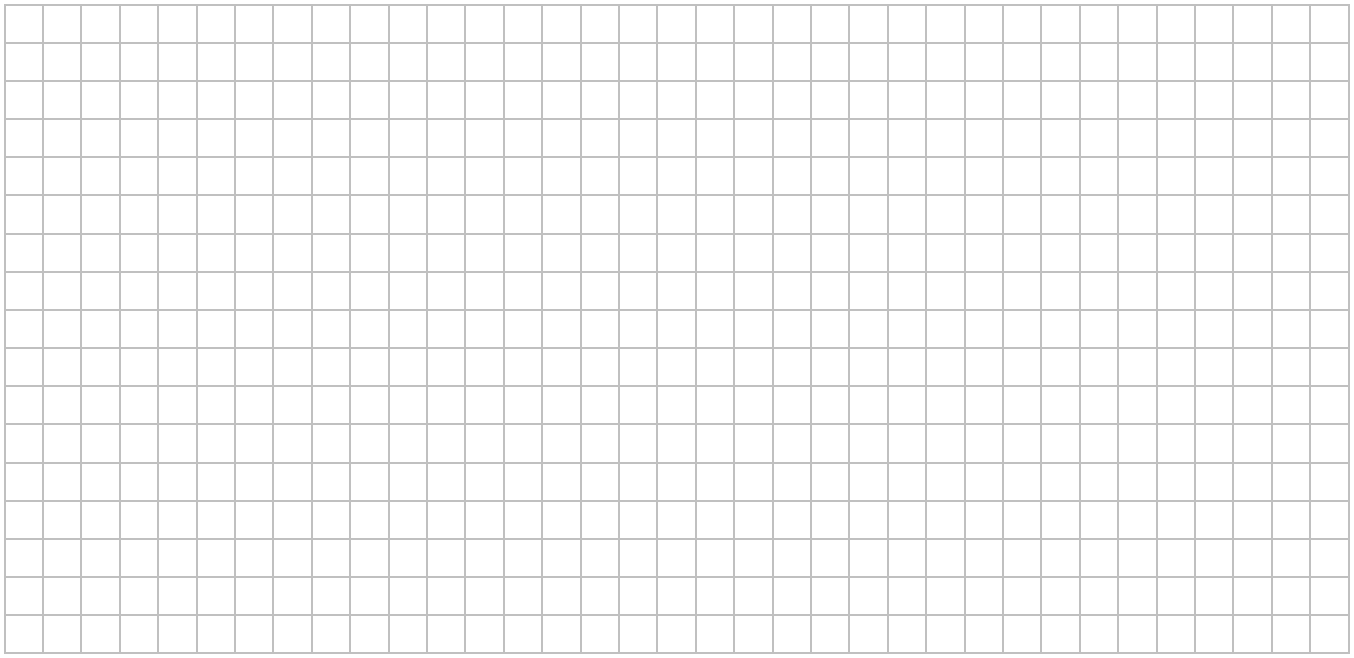
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



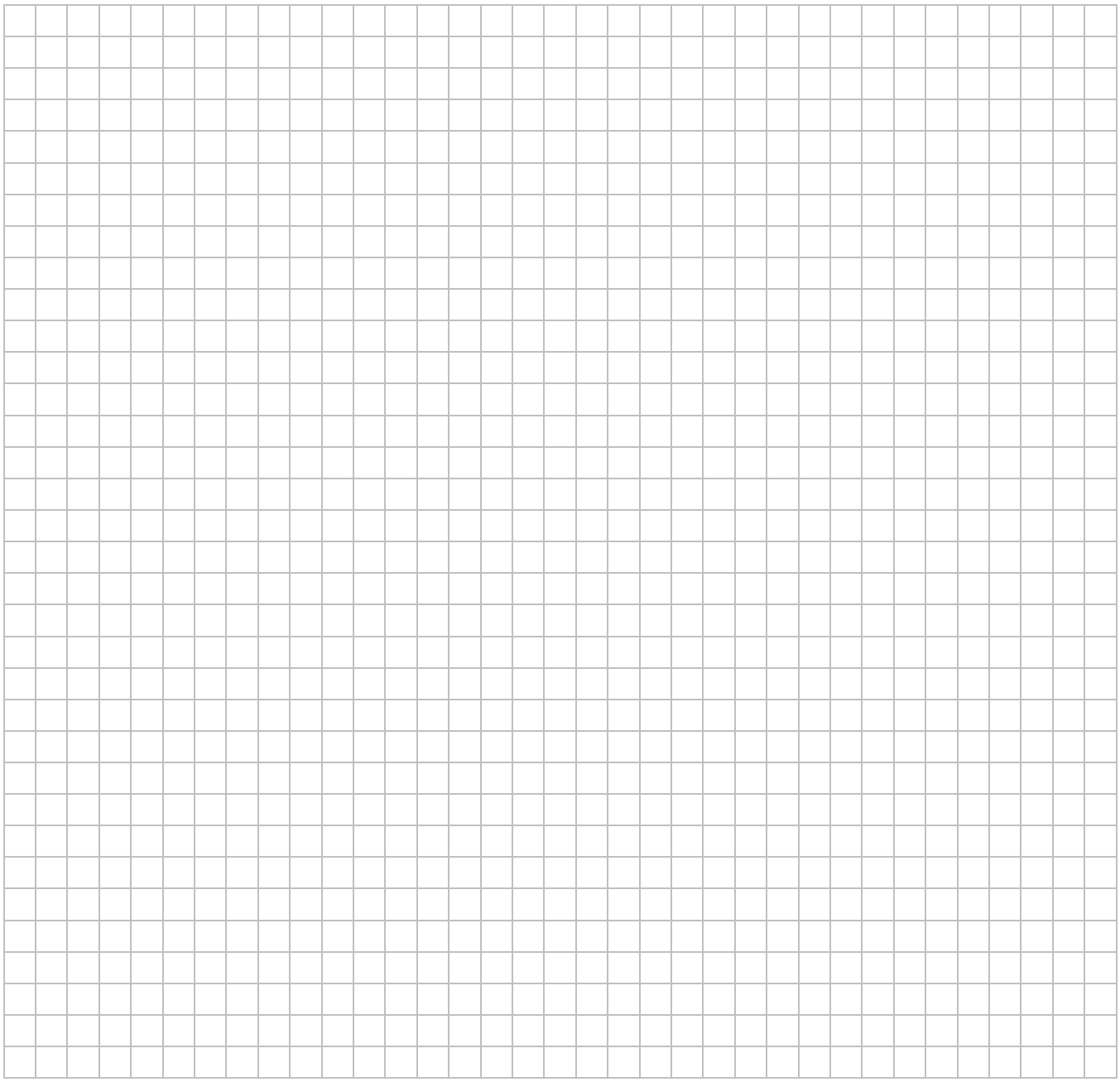
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Appendix C (of the SCWP) – QAPP

Quality Assurance Project Plan

6 Old River Road, Glenmont, NY (Site No. 401088)

New York State Department of Environmental Conservation
Standby Contract No. D009803 - Work Assignment 60

Project number: 60770465

February 2026

Prepared for:

New York State Department of Environmental Conservation, Region 4
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Appendices

Appendix A (of the QAPP) Pace Analytical SOP for PFAS Analysis
Appendix B (of the QAPP) Pace Analytical ELAP Certification

Acronyms and Abbreviations

ASP	Analytical Services Protocol
°C	degrees Celsius
CLP	Contract Laboratory Program
COC	chain of custody
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
FAP	Field Activities Plan
FD	field duplicate
HDPE	high density polyethylene
IDL	instrument detection limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MD	matrix duplicate
MDL	method detection limit
mg/L	milligrams per liter
mg/kg	milligrams per kilograms
MS	matrix spike
MSB	matrix spike blank
MSD	matrix spike duplicate
NEIC	National Enforcement Investigations Center
ng/L	nanograms per liter
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCB	polychlorinated biphenyl
PFAS	Per- and polyfluoroalkyl substances (PFAS)
ppbv	parts per billion by volume
PQO	Project Quality Objective
PTFE	polytetrafluoroethylene
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
RL	Reporting Limit
µg/kg	micrograms per kilograms
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
USEPA	United States Environmental Protection Agency

1. Introduction

AECOM USA, Inc. (AECOM) has prepared this Quality Assurance Project Plan (QAPP) for Site No. 401088 located at 6 Old River Road, Glenmont, Albany County, New York (**Figure 1**). This work was performed for the New York State Department of Environmental Conservation (NYSDEC) under Contract D009803 Work Assignment (WA)-60.

1.1 Purpose and Objective

Project work will be conducted in general accordance with the NYSDEC Division of Environmental Remediation (DER)-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010a), DER's Spill Response Guidance Manual, as applicable, technical requirements in Contract D009803 between NYSDEC and AECOM (NYSDEC and AECOM, 2019), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The QAPP is intended to be a companion document to the site-specific Work Plan prepared for each work assignment. A QAPP Addendum will be prepared as an Appendix included in the site-specific Work Plan for each Work Assignment, as needed to address site-specific conditions and project-specific requirements.

1.2 Project Management and Organization

1.2.1 Personnel

The general responsibilities of key project personnel are listed below.

Program Manager – Michael L. Spera, PE will have responsibility for overall program management and coordination of AECOM personnel and subcontractors to complete the work.

Project Manager – Abdiel López Torres, PG (AECOM) will have responsibility for overall project management and coordination with NYSDEC, and will coordinate the initiation and implementation of the work assignment activities. The AECOM Project Manager will serve as the initial and primary contact with NYSDEC throughout the project, and will be responsible for successful implementation of the project's QA/QC activities. The AECOM Project Manager may delegate a portion of the tasks required for successful implementation of the project to a qualified individual, the Site Manager, who will be on site during field activities (i.e., investigations, remedial action, operation and maintenance activities, etc.). The Site Manager will work under the direction of the AECOM Project Manager, and will be responsible for implementing applicable QC procedures in the field and verifying that all other AECOM field personnel adhere to these procedures and perform all activities as described in the project work plans.

Task Leaders/Field Team Leaders – Julie Healy (AECOM), will share the responsibility of implementing and coordinating the field and office project activities.

Program QA Officer – Robert Montione (AECOM) will serve as the Program Quality Assurance Officer (QAO) for work assignments issued under this contract. 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 AECOM database manager to assure that electronic deliverables provided by the laboratory are accurate and are formatted consistent with AECOM and NYSDEC requirements. The Program QAO may designate another qualified individual to serve as project QA officer to oversee the data-to-day quality assurance aspects of specific work assignments.

Project QA Officer – Robert Montione (AECOM), the AECOM Project QA Officer is responsible for verifying that the analytical laboratories adhere to the QA/QC requirements specified in this Site Specific QAPP and the requirements identified in the site-specific addendum to this Site Specific QAPP. The AECOM QA Officer will be the point of contact for the Laboratory's Project Manager and will personally communicate with the Laboratory's Project Manager to verify that all sample analyses are being performed such that the resulting data will be of sufficient quality for its intended purpose.

H & S Officer – Caroline Lee (AECOM) will be responsible for oversight of the preparation of the project health and safety plan, approving it, and tracking of its implementation.

Database Manager – Angela Toma-Eisele (AECOM), or an assigned qualified individual, 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.

Resumes for AECOM personnel have previously been submitted to the Bureau of Program Management. Resumes of individuals which have not been previously submitted to the NYSDEC and/or resumes of third-party data validator(s) (e.g., project specific) will be included in the site specific QAPP addendum.

1.2.2 Specific Tasks and Services

AECOM has obtained the following subcontractor specialist for services relating to laboratory/analytical services.

Laboratory Analysis – Pace Analytical Services, LLC (Pace) is the laboratory that has been assigned for the project, selected from a call-out list and subcontracted by NYSDEC. Pace is certified for aqueous and non-aqueous matrices.

All laboratories to be used for the work assignment shall hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for each laboratory to be used during the work assignment are provided in Appendix B of this Site Specific 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, this Site Specific QAPP and the site-specific QAPP addendum.

AECOM will be performing the services relating to data validation as described below.

Data Validation – An AECOM data validator will be assigned for data quality review and Data Usability Summary Report (DUSR) preparation as needed for each project. Data validation is performed to establish the data quality for all data which are to be considered when making project decisions.

Resumes for AECOM personnel have previously been submitted to the Bureau of Program Management. Resumes of individuals which have not been previously submitted to the NYSDEC and/or resumes of third-party data validator(s) (e.g., project specific) will be included in the site specific QAPP addendum.

1.3 Site Description and Location

Background data on the site, including the site description and location, site history, previous investigations of the surrounding area, and current conditions, are summarized in the site-specific

Work Plan (WP) and the site-specific Field Activities Plan (FAP). A site map showing proposed sampling locations is included in both.

2. Site Investigation

Site investigation procedures are provided below.

2.1 Field Sampling Procedures

Field activities are detailed in the FAP and are not repeated in the QAPP. Per- and polyfluoroalkyl substances (PFAS) sampling will follow the NYSDEC Part 375 guidance (April 2023) included in Appendix A of the site-specific FAP. Proposed sampling procedures to be utilized will be identified in the site-specific FAP.

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 FAP.

The procedures discussed here are general and will be superseded by project-specific requirements (as documented in the FAP). However, these procedures are provided for guidance in developing those plans.

Field equipment rinsate blanks (see Section 4.3.1) are generated and analyzed to monitor the effective of field decontamination procedures.

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

2.2.1 Decontamination Procedures

As indicated in the FAP, a decontamination pad will be constructed on the site. The pad will be appropriately sized and 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 will be accomplished using the following procedures:

- Liquinox (or equivalent) and potable water wash;
- Potable water rinse; and
- Distilled/deionized water rinse.

Solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g., Liquinox) 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. For PFAS sampling, all sources of water used for equipment decontamination will be verified in advance to be PFAS-free through laboratory analysis or certification.

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.

Electric submersible pumps (such as a Grundfos Redi-Flow II) will be decontaminated using the above steps followed by running a large volume (several gallons) of potable water through the pump, followed by an analyte-free water rinse.

Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be placed in a large clean plastic garbage can filled with potable water and then run for several minutes (to decontaminate both exterior and interior parts); submersible pumps will also be given a final analyte-free water rinse of both interior and exterior parts.

If bladder pumps are used, the pump will be disassembled and cleaned after each use. A new bladder will be used for each sample. Small parts, such as screens and gaskets will be replaced after each use. Dedicated air line tubing and sample tubing will be used at each monitoring well. The pump will be cleaned using the following steps:

- Liquinox (or equivalent) and potable water wash;
- Potable water rinse;
- Distilled/deionized water rinse;
- Solvent (reagent or pesticide grade) rinse if samples are collected for organic analysis;
- Dilute (10%) nitric acid rinse if samples are collected for metals analysis; and
- Distilled/deionized rinse, air dry.

For PFAS sampling, HPDE tubing will be replaced at each well and samples will be collected with an electrically operated tubing actuator (Waterra Hydrolift II). Used tubing will be properly disposed and not re-used eliminating the need for decontamination of this material.

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 and disposal.

2.2.4 Personnel Decontamination

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

3. Sampling Handling

3.1 Sample Identification and Labelling

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. Sample identification and labeling requirements are presented in FAP Section 8 and are not repeated here.

The procedures discussed here are general and will be superseded by project-specific requirements (as documented in the FAP). However, these procedures are provided for guidance in developing those plans. Sample identification may be limited to a specific number of alphanumeric characters to be consistent with the limitations of the laboratory tracking/reporting software. The general sample identification format follows (other designations may be used to accommodate the requirements of specific projects). It should be noted that the field sample IDs shown below are not those required for the EQuIS deliverable; AECOM will coordinate with the analytical laboratory so that the sample types and codes are entered properly for each field and QC sample, and that the codes are consistent with the most recent NYSDEC Valid Values.

MW = Monitoring Well

SB = Soil boring

SW = Surface Water

SD = Sediment

IA = Indoor Air

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

SV = Soil Vapor

FB = Field (Equipment Rinsate) Blank

TB = Trip Blank

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

As part of the unique identifier, the sample date will be included following any location that may have more than one sample collected. 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 the same system as the original by adding 50 to the original well ID (e.g., MW-51S_052411 would be a field duplicate of MW-01S_052411). 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.

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 name;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment, air); and
- Requested analyses.

3.2 Sample Bottles, Preservation, and Holding Times

Table 1 identifies the sample preparation and analytical method, matrix, holding time, containers, and preservatives for the typical analyses to be performed under this contract. 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. Aqueous samples for metals, PCBs, herbicides and pesticides will be collected in 1L amber jars with Teflon™ septa. Soil samples for VOC analysis will be collected in TerraCore® samplers and transferred to glass containers, and soil samples for Metals, cyanide, mercury, PCBs, pesticides and herbicides will be collected in glass jars. The sub-slab, indoor air, and outdoor air samples will be collected via standard 6-liter SUMMA® canisters. SUMMA® canisters for air samples will be batch certified by the laboratory.

Both aqueous and soil samples for PFAS analysis will be collected in high density polyethylene (HDPE) containers and will be stored/shipped separately from all aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

3.2.2 Sample Preservation

Samples will be preserved as indicated below and summarized on Table 1.

Aqueous Samples:

- Volatile organics – cooled to 4º C; HCl added to pH ≤ 2.
- Metals – cooled to 4º C; HNO_3 added to pH ≤ 2.
- Cyanide – NaOH to pH ≥ 12.
- Mercury – HNO_3 added to pH ≤ 2.
- PFAS – cooled to 4º C (in a separate cooler, with regular ice)
- Other organic fractions (semivolatiles, herbicides/pesticides, PCBs) – cooled to 4° C, no chemical preservation.

Non-Aqueous (e.g., soil and sediment) Samples:

- VOC soil samples – collected in VOA vials with H2O, frozen to -10°C
- Mercury & Cyanide – cooled to ≤6 °C, no chemical preservation.
- PFAS – cooled to 4º C (in a separate cooler, with regular ice)

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

Holding times (see Table 1) are calculated from the time of sample collection; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection except for instances with shorter holding time parameters. Holding time requirements will be those specified in the analytical method.

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.

3.2.4 Sample Custody

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

Custody Definitions

Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Project Manager (or his/her designee).

Under Custody - A sample is “Under Custody” if:

- It is in one's possession, or
- It is in one's view, after being in one's possession, or
- It was in one's possession, and one placed it under lock, or
- It is in a designated secure area.

Responsibilities

The Project Manager will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Train all field sampling personnel in the methodologies for carrying out COC activities and the proper use of all COC and record documents.
- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

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

Sample bottle tracking sheets or the chain-of-custody 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. Synthetic (blue) ice packs shall not be used when sampling for PFAS. Samples for PFAS analysis will be stored and shipped separately from other samples to avoid cross-contamination. 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 custody 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.

3.3 Laboratory Sample Receipt

Upon receipt at the laboratory, a laboratory representative inspects the samples for integrity and checks the shipment against the COC/analytical task order form. Discrepancies are addressed at this point and documented on the COC form and the cooler checklist (an example will be provided in each of the project-specific Field Sampling and Analysis Plans). Discrepancies are reported to the Laboratory Project Manager who contacts the AECOM Project Manager or QAO for resolution.

When the shipment and the COC are in agreement, the laboratory sample 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.

3.3.1 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)
- Transfers of samples in and out of storage are documented.

3.3.2 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 or at or below -20°C (PFAS) 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. Data Quality Requirements

4.1 Analytical Methods

Soil vapor and air sample analyses for this contract will utilize EPA Method TO-15.

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

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

Site Characterization Analysis

- Volatile Organics - SW-846 Method 8260C
- Semivolatile Organics – SW-846 Method 8270D
- Pesticides – SW-846 Method 8081B
- PCBs – SW 846 Method 8082A
- 1,4 Dioxane - SW-846 Method 8270D SIM
- Mercury – SW-846 Methods 7470 (water) and 7471 (soil)
- Other Target Analyte List metals – SW-846 Method 6010B.
- Per- and polyfluoroalkyl substances (PFAS) by Method 1633A.

Waste Characterization Analysis

- Full Toxicity Characteristic Leaching Procedure (TCLP) – Method SW-846 8151
- Ignitability – SW 846 Method 1110
- Corrosivity – SW 846 Method 1030
- Reactivity – Total Cyanide SW-846 Method 9014; Total Sulfide SM4500S-F (aqueous), Method 9030 (soil)

Analytical methods are presented in the NYSDEC Analytical Services Protocol (ASP), 2005 (February 2008 supplement for TO-15) and USEPA, Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, December 2024. 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 for all samples listed under Site Characterization Analysis. Full Category A deliverables will be required for all samples listed under Waste Characterization Analysis. A list of the 40 PFAS compounds (PFAS Analyte List) to be analyzed under Method 1633A is included as Table 3.

NYSDEC has assigned Pace to this project, and is certified by the NYSDOH Environmental Laboratory Approved Program (see Section 1.2). The laboratory is in good standing for the applicable parameter groups.

4.2 Quality Assurance Objectives

Data quality objectives (DQOs) 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.

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions.

More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

PQOs are provided in the site-specific QAPP addendum and FAP.

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 and USEPA document for the applicable method. Analytes detected analytes 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 1633A are listed in Table 3.

The RLs 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, 2010b), groundwater and surface water criteria (compiled in TOGS 1.1.1), and soil and water guidance for PFAS (NYSDEC 2020).

Reporting limits for each analysis can be found in Table 2. Reporting limits for PFAS should be less than or equal to 2 nanograms per liter (ng/L) for aqueous samples and 0.5 µg/kg (ppb) for solid samples.

For groundwater, the RL goal is 0.5-1.0 µg/L for VOCs, 10-20 µg/L for SVOCs, 1-100 ng/L for PFAS, and 0.1 ug/L for 1,4-dioxane.

For air, 0.2 - 10 µg/m3 (per decision matrices A to F) for VOCs.

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 /matrix spike duplicate (MS/MSD) analyses will be performed once

for every 20 samples for VOCs each parameter for soils and groundwaters. No MS/MSDs are performed for air samples.

Relative Percent Difference (RPD) criteria determined from laboratory performance data are used to evaluate precision between duplicates. 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 MS/MSDs and 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 RPD:

$$\mathbf{RPD = 100 \times [(|X_1 - X_2|) / (X_1 + X_2)/2]}$$

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 RL. 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 matrix blank spike or laboratory control sample (LCS) 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:

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

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 projects under this NYSDEC contract, accuracy will be normally presented as percent recovery.

Routine organic analytical protocol requires a surrogate spike (or labeled standards for PFAS) in each sample. Surrogate recovery will be defined as:

% Recovery = (R/S) x 100

Where:

S = surrogate spike concentration

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 labs 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 labs 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

Sampling Completeness (%) = (Sc/Sp) × 100

Where:

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

Sp = Samples planned (as documented in the FAP 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 work assignments, the default overall completeness goal is 90 percent usable 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 typical QA/QC samples and RLs. 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 FAP for matrices such as surface water or leachate seeps).

Field Equipment (Rinsate) blanks for bailers and pump tubing: For initial sampling, as well as at subsequent rounds of sampling when bailers or tubing are reused, a section of each type of tubing used per sampling batch or at least one of the bailers used per decontamination 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.

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. The rinsate blanks will be collected from the soil and groundwater sampling equipment. One field equipment blank will be collected for every twenty samples.

For PFAS sampling, equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected at a minimum frequency of one per day, for each matrix. The rinsate blanks will be collected from the soil 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 duplicate samples are collected from a single location and device (e.g., split spoon sampler). Soil 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.

The default field duplicate precision (RPD) objective is ≤50% percent RPD for all matrices where the sample concentration is at least two times the RL. Where the analyte is detected in both samples, but the concentration is less than 2 times the RL, precision is assessed by the absolute difference, which should be less than the RL. 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 frequency of one per 20 environmental samples for both aqueous and non-aqueous samples being submitted for 8260, 8270, 6010, 9010, 7471, 8081, 8082, and 1633A analysis.

4.3.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. Split samples may also be generated if a site owner or PRP requests them. A split sample will be defined as at least two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples may be conducted only when specifically requested by NYSDEC.

4.3.4 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 lab 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 and non-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).

4.3.5 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 Quality Assurance

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity) and turbidity are detailed below. 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 upon delivery of the equipment.

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 (except for 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. Field Data Documentation

Field reporting documentation, including field log books and field data reporting forms, is discussed in FAP Section 9; therefore, it is not repeated here.

6. 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 photoionization detector. See also Section 4.4 of this QAPP for additional discussion.

The organic vapor analyzer (MultiRAE, or equivalent organic vapor analyzer) 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.

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 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from sources traceable to National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials Class 1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily.

This will verify that the quality of the standards and reagents is not compromised, and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (e.g., 4°C ± 2°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Air Supply System – Laboratories performing air/soil vapor sample analyses must maintain a sufficient supply of analyte-free air for all project needs. The grade of air must be of the highest quality in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

6.2.2 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.

6.2.3 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.

6.2.4 Calibration Reference Standards

Two types of reference standards will be used by the standby laboratories for calibration:

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators, and ovens, are generally used for periodic calibration.

Chemical standards, such as Standard Reference Materials (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.

6.2.5 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.

6.2.6 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. Data Reduction, Validation, and Reporting

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the Work Plan, 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 (milligrams per kilogram [mg/kg] or milligrams per liter [mg/L]), parts per billion (micrograms per kilogram [µg/kg] or micrograms per liter [µg/L]), or parts per trillion (ng/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. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

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 contract, Category B deliverables are the default and will be provided for all deliverables generated under the contract 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) requirements, laboratories subcontracted by AECOM for this work will be required to submit electronic deliverables in an EQuIS 4-file format consistent with AECOM standards. AECOM's database manager will be responsible verifying that the file submitted meets these specifications including verifying that current NYSDEC Valid Values were used for sample coding; providing an Excel (or Access) 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 hard 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

As discussed in the Standby Contract (D009803), independent third-party validation is preferred when data validation is required. Data generated for work assignments under this contract will

typically be validated by a third-party subcontractor (not affiliated with the laboratory or with AECOM).

However, for WA-60, AECOM will be performing in-house data validation. AECOM will follow guidelines established in the USEPA Region 2 SOPs 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). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-10-011, January 2010, and the National Functional Guidelines for Organic Data Review, EPA-540-R-08-01, June 2008). For PFAS samples, Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids (NYSDEC 2023) shall be followed.

As discussed in the Standby Contract (D009803 – Attachment 1, Work Element V), a DUSR provides a thorough evaluation of analytical data without the costly and time-consuming process of third-party validation. The primary objective of a DUSR is to determine whether the data, as presented, meet the site-specific criteria for data quality and data use. Appendix 2B of NYSDEC's DER-10 provides guidance on data deliverables and development of a DUSR.

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 RLs 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 and EPA Functional Guidelines as much as possible, 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

Subsequent to review of the items evaluated in the subcontractor data validator reports (DUSRs) and accompanying tables, AECOM's QA staff then prepares a brief data usability summary. The data usability summary, which will be provided as part of the project report, encompasses 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 QAO 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 bound field logbooks 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 entering the data into data files. Where appropriate, the data files will be set up for direct input into the project database. Subjective data will be filed as hard copies 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 standard procedures and QC checks. The second level of review consists of the Project Manager, Task 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 Site Manager will review data sets for anomalous values. The Project Manager, who will review field reports for reasonableness and completeness, will validate subjective field and technical data.

8. 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 QA Officer will keep a tentative schedule on record that details the number and types of audits.

8.2 Field Audits

The need for field audits will be determined on a project-specific basis as required by the WA or in the approved work plans for the project. Not all the aspects listed below will be necessary or appropriate for projects for which field audits are specified.

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 Work Plan and FAP
- 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
- 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

As part of the laboratory subcontractor procurement process under the AECOM/NYSDEC Standby Engineering Contract, 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 and NYSDEC.

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 QA Officer and the Project Manager, a plan for implementing the corrective action to be taken on non-conformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files.

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. 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 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 Actions 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

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 are 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 the AECOM QAO and Project Manager.

10. 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
- Non-conformance records.

Periodic assessment of field and laboratory QA/QC activities and data accuracy, precision, and completeness will be conducted and reported by the laboratory. Items to be included in the QA reports are the summary of results for the performance or the system audit and, where applicable:

- Assessment of adherence to work scope and schedule for the audited task
- Assessment of the precision, accuracy, and completeness of sample batches and subsequent status of data processing and analyses
- Significant QC problems and the status of any ongoing corrective actions
- Changes to the site-specific Work Plan
- Status of implementation of the site-specific Work Plan.

Monthly project status reporting to the NYSDEC 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 will be responsible for verifying that records and files related to the work assignment 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. References

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

NYSDEC and AECOM USA Inc. (AECOM), 2019. Standby Contract No. D009803 between the State of New York Department of Environmental Conservation and AECOM for Engineering Services. October.

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USEPA, 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-10-011. January.

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Tables

Table 1
Sample Bottle, Volume, Preservation, and Holding Time Summary
Quality Assurance Project Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

Matrix / Analysis	Sample Prep Method[1,2]	Analytical Method	Sample Bottles[3]				Min Vol Rqd	Preservation	Holding Time[4,5]		Comment
			Mat'l	Size	Qty	Source			Extraction	Analysis	
Aqueous Samples											
Volatile Organics	SW 846 5030B	EPA Method 8260D	G	40 mL	2 or 3	Lab	40 mL	HCl to pH ≤ 2	NA	14 days	7 days if not preseved to pH < 2
Semivolatile Organics	SW 846 3510C/3511/3520C/3535A	EPA Method 8270D	G	1L	2		1L	None	7 days	14 days	
1,4-Dioxane	SW 846 3510C	EPA Method 8270D/8270 SIM	G	1L	2		1L	None	7 days	40 days	
Metals	SW 846 3005A/3010A/3015A	EPA Method 6010C	P	250 mL	1		100 mL	HNO3 to pH<2	NA	6 months	
Cyanide	per Analytical Method	EPA Method 9010	P	250mL	2		500 mL	≤6 °C; NaOH to pH>12	NA	14 days	
Mercury	per Analytical Method	EPA Method 7470A	P	500mL	1		100 mL	HNO3 to pH<2	NA	28 days	
PCBs	SW 846 3510C/3511/3520C/3535A	EPA Method 8082A	G	1L	2		1L	None	7 days	1 Year	
Pesticides		EPA Method 8081B	G	1L	2		1L	None	7 days	40 days	
PFAS	per Analytical Method	EPA Method 1633A	HPDE	500 mL	2		500 mL	None	28 days	90 days	Frozen -10°C
Soil Samples											
Volatile Organics	SW 846 5035	EPA Method 8260D	TerraCore®	5 or 25 g	3 or 1	Vendor/lab	5 g	VOA Vial + H2O	7 days	14 days	Frozen -10°C
Semivolatile Organics	SW 846 3540C/3541/3545A/3546/3550C	EPA Method 8270D	G	8 oz	1	Lab	100 g	None	14 days	40 days	
1,4-Dioxane	SW 846 3540C/3541/3545A/3546/3550C	EPA Method 8270D/8270 SIM	G	8oz	1		100 g	None	7 days	40 days	
Metals	SW 846 3050B	EPA Method 6010C	G	8 oz	1		100 g	None	NA	6 months	
Cyanide	per Analytical Method	EPA Method 9010	G	4 oz	1		100 g	≤6 °C	NA	28 days	
Mercury	per Analytical Method	EPA Method 7471A	G	8 oz	1		100 g	≤6 °C	NA	28 days	
PCBs	SW 846 3540C/3541/3545A/3546/3550C	EPA Method 8082	G	8 oz	1		100 g	None	14 days	1 Year	
Pesticides		EPA Method 8081	G	8 oz	1		100 g	None	14 days	40 days	
PFAS	per Analytical Method	EPA Method 1633A	HPDE	90 ml	2		125 mL	None	28 days	90 days	Frozen -10°C
Soil Vapor and Air Samples											
TO-15	per Analytical Method	EPA Method TO-15	SS	6L	1	Lab	6L	None	14 days	14 days	
Waste Characterization (IDW)											
TCLP	NA	SW 846 8151	G	8 oz	1	Lab	100 g	None	7 days	14 days	
Corrosivity	NA	SW 846 1110	G	8 oz	1		100 g	None	7 days	14 days	
Ignitability	NA	SW 846 1030	G	8 oz	1		50 g	None	NA	28 days	
Total Sulfide	NA	SM4500S-F (aqueous) Method 9030 (soil)	P (a); G (s)	250 mL (a); 8 oz (s)	2 (a); 1 (s)		500 mL (a); 100g (s)	NaOH + Zinc Acetate (a); None (s)	7 days	28 days	(a) holding time is immediate if not preserved to pH 9
Total Cyanide	NA	SW 846 9014	G	8 oz	1		100 g	None	7 days	14 days	

Notes:
(1) Laboratory may propose alternate extraction/preparation methods, subject to NYSDOH ELAP certification and AECOM approval.
(2) More recent versions of analytical methods may be used subject to NYSDEC ELAP certification and AECOM approval.
(3) Bottles typical. EnCore or similar samplers for VOCs in soil will be provided by laboratory or AECOM on a case-by-case basis. 250 mL bottles may be used for extractable organics if NYSDOH ELAP certified.
(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 may be sufficient for SVOCs, pesticides, PCBs, and metals.
(7) Other collection methods consistent with SW 846 5035 may be used. Encore or similar samplers (e.g. Terra Core) are typically purchased from an outside supplier by AECOM but may also be requested (for a fee) from the analytical laboratory.
G = Glass
P = Plastic
SS = Stainless Steel
(a) = aqueous
(s) = soil
SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.
SM = Standard Method

Table 2
Reporting Limits and QA/QC Sample Quantity Summary
Quality Assurance Project Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

AECOM

Matrix / Analysis		Analytical Method	Laboratory	Report Limit - Typical (units as specified)	Field Sample Quanitity	Matrix Spike (MS)	MS Duplicate or Matrix dupilicate	Field Duplicate	Equipment/ Rinse Blank[2]	Field Blank	Trip Blank	Total Billable Analyses
Aqueous Samples												
Volatile Organics		EPA Method 8260D	Pace	0.5 - 2.0 µg/L (typical)	10	2	2	2	0	0	2	18
Semivolatile Organics		EPA Method 8270D		0.5 - 20 µg/L (typical)	5	1	1	1	0	0	0	8
1,4-Dioxane SIM		EPA Method 8270D/8270 SIM		0.2 µg/L	5	1	1	1	0	0	0	8
Metals		EPA Method 6010C		Analyte-specific	5	1	1	1	0	0	0	8
Cyanide		EPA Method 9010		0.010 mg/L	5	1	1	1	0	0	0	8
Mercury		EPA Method 7471A		0.00020 mg/L	5	1	1	1	0	0	0	8
PCBs		EPA Method 8082		0.20 µg/L	5	1	1	1	0	0	0	8
Pesticides		EPA Method 8081		0.0020 µg/L - 1.0 µg/L (typical)	5	1	1	1	0	0	0	8
PFAS		EPA Method 1633A		2 ng/L	5	1	1	1	0	0	0	8
Soil Samples												
Volatile Organics		EPA Method 8260D	Pace	0.0010 mg/Kg - 0.10 mg/Kg (typical)[1]	4	1	1	1	1	0	1	9
Semivolatile Organics		EPA Method 8270D		0.0010 mg/Kg - 0.10 mg/Kg (typical)[1]	4	1	1	1	1	0	0	8
1,4-Dioxane		EPA Method 8270D/8270 SIM		0.05 mg/Kg	*	*	*	*	*	0	*	*
Metals		EPA Method 6010C		Analyte-Specific	4	1	1	1	1	0	0	8
Cyanide		EPA Method 9010		0.50 mg/Kg	4	1	1	1	1	0	0	8
Mercury		EPA Method 7471A		0.025 mg/Kg	4	1	1	1	1	0	0	8
PCBs		EPA Method 8082A		0.020 mg/Kg	4	1	1	1	1	0	0	8
Pesticides		EPA Method 8081B		0.0040 mg/Kg - 0.10 mg/Kg (typical)[1]	4	1	1	1	1	0	0	8
				100 µg/kg	4	1	1	1	1	0	0	8
PFAS		EPA Method 1633A		0.5 µg/kg[2]	4	1	1	1	0	1	0	8
Soil Vapor and Air Samples												
TO-15		EPA Method TO-15	Pace	Analyte-specific	10	1[3]	0	0	0	0	0	11
Waste Characterization (IDW)												
Full TCLP		SW 846 8151	Pace	Analyte-specific	2	0	0	0	0	0	0	2
Ignitability		SW 846 1110		N/A	2	0	0	0	0	0	0	2
Corrosivity		SW 846 1030		N/A	2	0	0	0	0	0	0	2
Reacitvity	Total Sulfide	SM4500S-F (aqueous) Method 9030 (soil)		N/A (aqueous) 2.0 mg/Kg (soil)	2	0	0	0	0	0	0	2
	Total Cyanide	SW 846 9014		0.50 mg/Kg		0	0	0	0	0	0	

Notes:
* = 1,4-Dioxane soil samples will be collected with SVOC samples, but the compound has a specified reporting limit.
(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) Field equipment rinsate blank quantity will vary depending on sample collection rate and types of sampling equipment used; quantity may be greater or less than that shown. See Work Plan or FAP.
(3) Matrix spikes and duplicates are not explicitly required by method TO-15 but are usually included as part the laboratory's analytical QA program.

Table 3
PFAS Compound Reporting Limits by EPA Method 1633
Quality Assurance Project Plan
6 Old River Road, Glenmont, NY (Site No. 401088)

Group	Analyte Description	Abbreviation	CAS Number	Groundndwater (ng/L)		Soil, Sediment (µg/kg)	
				RL	MDL	RL	MDL
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5	1.00	0.21	0.20	0.02
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4	1.00	0.26	0.20	0.03
	Perfluorohexanesulfonic acid	PFHxS	355-46-4	1.00	0.28	0.20	0.08
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8	1.00	0.33	0.20	0.02
	Perfluorooctanesulfonic acid	PFOS	1763-23-1	1.00	0.38	0.20	0.03
	Perfluorononanesulfonic acid	PFNS	68259-12-1	1.00	0.25	0.20	0.02
	Perfluorodecanesulfonic acid	PFDS	335-77-3	1.00	0.29	0.20	0.03
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5	1.00	0.29	0.20	0.03
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4	4.00	2.20	0.80	0.32
	Perfluoropentanoic acid	PFPeA	2706-90-3	2.00	0.43	0.40	0.05
	Perfluorohexanoic acid	PFHxA	307-24-4	1.00	0.24	0.20	0.03
	Perfluoroheptanoic acid	PFHpA	375-85-9	1.00	0.27	0.20	0.02
	Perfluorooctanoic acid	PFOA	335-67-1	1.00	0.26	0.20	0.03
	Perfluorononanoic acid	PFNA	375-95-1	1.00	0.19	0.20	0.01
	Perfluorodecanoic acid	PFDA	335-76-2	1.00	0.21	0.20	0.02
	Perfluoroundecanoic acid	PFUnA	2058-94-8	1.00	0.20	0.20	0.02
	Perfluorododecanoic acid	PFDoA	307-55-1	1.00	0.20	0.20	0.02
	Perfluorotridecanoic acid	PFTrDA	72629-94-8	1.00	0.30	0.20	0.02
	Perfluorotetradecanoic acid	PFTeDA	376-06-7	1.00	0.26	0.20	0.02
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6	4.00	1.00	1.00	0.05
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4	4.00	0.82	0.80	0.06
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1	2.00	0.56	0.40	0.03
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5	2.00	0.54	0.40	0.03
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6	2.00	0.55	1.00	0.06
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4	4.00	0.75	0.80	0.07
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2	5.00	3.00	0.80	0.50
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4	4.00	1.10	0.80	0.09
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5	5.00	2.20	1.00	0.19
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3	25.00	11.00	5.00	1.30
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4	25.00	9.50	5.00	1.50
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6	1.00	0.23	0.20	0.03
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8	1.00	0.33	0.20	0.03
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2	1.00	0.34	0.20	0.02
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9	1.00	0.36	0.20	0.04
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6	1.00	0.40	0.20	0.03
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7	10.00	2.70	2.00	0.22
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2	10.00	2.70	2.00	0.22
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1	4.00	0.96	1.00	0.06
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9	4.00	1.10	0.80	0.09
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7	2.00	0.35	0.40	0.03

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

Appendix A (of the QAPP) Pace Analytical SOP for PFAS Analysis

Test Method Standard Operating Procedure (SOP): Pace® Analytical Services

Pace ANALYTICAL SERVICES	**ENV-SOP-WCOL-0158 v04_PFAS by Method 1633**
	Effective Date: 04/19/2024

Management Approval:
Matthew Miller Approved on 4/19/2024 12:07:45 PM
Laurence Hayden Approved on 4/19/2024 2:03:28 PM
Erin Boyd Approved on 4/19/2024 2:04:35 PM

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1.0 SCOPE & APPLICATION

This standard operating procedure (SOP) describes the laboratory procedure for the determination of per- and polyfluoroalkyl substances (PFAS) in Table 1 in aqueous (all non-potable water and leachate) and solid (soil, biosolids, sediment) samples by liquid chromatography/mass spectrometry (LC-MS/MS).

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 analyte consisting of the sum of the linear and branched isomer concentrations.

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. The laboratory must demonstrate the ability to generate acceptable results using the procedure in Sections 11.3.1 and 11.4.

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.

1.1 Target Analyte List and Limits of Quantitation (LOQ)

The target analytes that can be determined by this SOP and the associated LOQ is provided in Table 1, Appendix A.

LOQs are established in accordance with Pace policy and SOPs for method validation and for the determination of detection limits (DL) and quantitation limits (LOQ). DL and LOQ are routinely verified and updated when needed. The current LOQ for each target analyte that can be determined by this SOP as of the effective date of this SOP is provided in Table 1, Appendix A. LOQ is equivalent to Minimum Level of Quantitation (ML).

DL and LOQ are always adjusted to account for actual amounts used and for dilution.

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 9.2.1) using isotopically labeled compounds added to the samples before extraction.

Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions, where applicable.

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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.

Results for target analytes are recovery corrected by the method of quantification (i.e., either isotope dilution or extracted internal standard quantification, see Section 9.2.1). 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.

The quality of the analysis is assured through reproducible calibration and testing of the extraction, cleanup, and LC-MS/MS systems.

- **Extraction**
    - **Aqueous samples** are spiked with isotopically labeled standards (EIS), extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.
    - **Solid samples** are spiked with EIS, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

3.0 INTERFERENCES

Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and elevated baselines causing misinterpretation of chromatograms. Specific selection of reagents and solvents is required.

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 PFAS levels are less than half the LOQ.

Prior to use, glassware must be solvent rinsed and then air dried. A solvent rinse procedure using methanolic ammonium hydroxide (1%) and methanol is recommended.

All parts of the SPE manifold must be cleaned between samples by rinsing with methanolic ammonium hydroxide (1%) and air drying prior to use. Smaller parts, like the needles, adapters, reservoirs, and stopcocks associated with the manifold should be rinsed with tap water prior to rinsing with methanolic ammonium hydroxide (1%) and air drying. After loading the samples but prior to elution procedures, the chamber should be rinsed with methanolic ammonium hydroxide (1%).

All materials used in the analysis must be demonstrated to be free from interferences by running method blanks (Section 11.1.1) at the beginning and with each extraction batch (samples started through the extraction process on a given analytical batch to a maximum of 20 field samples).

Reagent water (Section 8.1) can be used to simulate water samples and Ottawa sand and/or reagent-grade sand (Section 7.2) can be used to simulate soils. The laboratory must verify that the source product used does not contain PFAS in detectable amounts.

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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 9.3 can be used to reduce or eliminate these interferences and thereby permit reliable determination of the PFAS at the levels shown in Table 1. The most frequently encountered interferences are fluoropolymers; however, when analyzing whole fish samples, bile salts (e.g., Taurodeoxycholic Acid [TDCA]) can interfere in the chromatography. For this reason, analysis of a standard containing TDCA is required as part of establishing the initial chromatographic conditions (see Sections 8.2.7 and 9.2.3).

4.0 DEFINITIONS

Refer to the Laboratory Quality Manual for a glossary of common lab terms and definitions.

- **Extracted Internal Standard (EIS) quantification** – The response of the target compound is compared to the response of the isotopically labeled analog of another compound with chemical and retention time similarities.
- **Isotope dilution (ID) quantitation** – A means of determining a naturally occurring (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 13C (Carbon-13) or Deuterium (D or 2H). These labeled compounds do not occur in nature, so they can be used for isotope dilution quantitation or other method-specific purposes.
- **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.

5.0 HEALTH & SAFETY

Contact your supervisor or local safety coordinator with questions or concerns regarding safety protocol or safe handling procedures for this procedure

The following sections provide general health and safety information about chemicals and materials that may be present in the laboratory.

- The toxicity or carcinogenicity of each chemical material used in the laboratory has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable.
- The laboratory maintains documentation of hazard assessments and OSHA regulations regarding the safe handling of the chemicals specified in each method. Safety data sheets for all hazardous chemicals are available to all personnel. Employees must abide by the health, safety and

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environmental (EHS) policies and procedures specified in this SOP and in the Pace® Chemical Hygiene / Safety Manual (COR-MAN-0001)

- Personal protective equipment (PPE) such as safety glasses, gloves, and a laboratory coat must be worn in designated areas and while handling samples and chemical materials to protect against physical contact with samples that contain potentially hazardous chemicals and exposure to chemical materials used in the procedure.
- Concentrated corrosives present additional hazards and are damaging to skin and mucus membranes. For procedures that require use of acids, use acids in a fume hood whenever possible with PPE designed for handing these materials. If eye or skin contact occurs, flush with large volumes of water. When working with acids, always add acid to water to prevent violent reactions. For procedures that that emit large volumes of solvents (evaporation/concentration processes), these activities must be performed in a fume hood or apparatus that reduces exposure.

6.0 .SAMPLE COLLECTION, PRESERVATION, HOLDING TIME & STORAGE

The laboratory provides containers for the collection of samples upon client request. Refer to *Sample Container Shipping* SOP [Admin SOP ENV-SOP-WCOL-0006] for procedures related to preparation of bottle kits for the test method(s) associated with this SOP.

The laboratory performs samples collection for samples to be analyzed by this SOP in accordance with *Field Services* SOP [FS SOP ENV-SOP-WCOL-0013]. Refer to this SOP for these instructions.

Container Type, Minimum Sample Amount, Preservation, and Holding Time Requirements:

Matrix	Container Size & Type	Required Sample Amount[1]	Preservation	Holding Time
Aqueous (non-potable water) containing <100 mg/L SS	2 x 500 mL linerless HDPE 1 x 125 mL linerless HDPE[3]	500 mL	Thermal: 0-6°C OR ≤ -20°C Chemical: None	Collection to Prep: 28 or 90 Prep To Analysis: 28[4] or 28
Aqueous (leachate)	2 x 125 mL linerless HDPE	100 mL	Thermal: 0-6°C OR ≤ -20°C Chemical: None	Collection to Prep: 28 or 90 Prep To Analysis: 28 or 28
Solid (soil and sediment)	3 oz/ 90 mL linerless polypropylene straight sided	5 g	Thermal: 0-6°C OR ≤ -20°C Chemical: None	Collection to Prep: 90 Prep To Analysis: 28[5]
Solid (biosolid)	3 oz/ 90 mL linerless polypropylene straight sided	0.5 g	Thermal: 0-6°C OR ≤ -20°C Chemical: None	Collection to Prep: 90 Prep To Analysis: 28

[1]Aqueous sample containers should be filled only to the appropriate gradation marked on the container, or to the shoulder of the container if no gradations are provided. To allow room for expansion during freezing (if necessary), aqueous sample containers should not be overfilled.

[2]Miniumum amount needed for each discrete analysis. Solid and biosolid sample amounts reflect the dry sample weight.

[3]Needed for percent suspended solids and screening analyses.

[4]In the single lab validation, issues were observed with certain perfluorooctane sulfonamidoethanols and perfluorooctane sulfonamidoacetic acids after 7 days.

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[5]*Samples may need to be extracted as soon as possible if NFDHA is an important analyte. The onus is on the client to indicate if NFDHA is an important analyte, prior to shipment. If no such designation is given, follow stated hold time.*

Note: Project-specific requirements dictate which storage condition applies. The storage condition to be used for each project must be formally documented in written form (QAPP or otherwise) before samples are received. Without any prior indication from the client, the lab will store all aqueous and solid samples at 0-6°C until extraction, with a 28-day preparation holding time.

Thermal preservation is checked and recorded on receipt in accordance with *Sample Receiving* SOP [Admin SOP ENV-SOP-WCOL-0007]. Chemical preservation is checked and recorded at time of receipt or prior to sample preparation.

After receipt, samples are stored at 4 ± 2°C or ≤ 20°C until sample preparation. Prepared samples (extracts, digestates, distillates, other) are stored at 4 ± 2°C until sample analysis.

After analysis, samples are retained as stated in the Pace® standard terms and conditions, unless otherwise specified in the analytical services contract. Samples are then disposed of in accordance with Federal, State, and Local regulations.

7.0 EQUIPMENT & SUPPLIES

NOTE: Refer to the Major Operational Equipment List [QA Control Log ENV-FRM-WCOL-0213] for specific details regarding the equipment utilized during this procedure.

7.1 Equipment

Due to the possibility of adsorption of analytes onto glass, HDPE containers are used for all standard, sample, and extraction preparations. Any time a new lot of SPE cartridges, solvents, cryovials, or autosampler vials are used, it must be demonstrated that a MB is reasonably free of contamination and that the criteria in Section 11.1.1 are met.

Sample Preparation

- Oven – Capable of maintaining a temperature of 105 ± 5 ºC
- Analytical balance – Capable of weighing 0.0001 g
- Top loading balance – Capable of weighing 0.01 g
- Calibrated mechanical variable volume pipettes with disposable HDPE or polypropylene tips (10 µL to 5 mL) – used for preparation of calibration standards and spiked samples
- Point of Use water preparation system – Millipore Synergy – Used for QC samples to verify the systems are PFAS free
- Ultrasonic mixer (sonicator)
- pH Paper, range 0-14 - (Whatman® PanpehaTM or equivalent), 0.5-unit readability
- Analog or digital vortex mixer, single or multi-tube (Fisher Scientific 02-215-452, or equivalent)
- Volumetric flasks, Class A

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- 15- and 50-mL conical polypropylene tubes with polypropylene screw caps for preparing and storing extract solutions and for collection of eluents (Fisher Scientific 05-527-90 and 14-432-22, or equivalent)
- Variable speed mixing table (VWR Model 3500 Orbital Shaker, or equivalent)

Filtration

- Silanized glass wool (Pyrex 3950 or equivalent)
- Disposable syringe filter, 25-mm, 0.2-µm Nylon membrane, Phenomenex AF0-1207-52 or equivalent
- Glass fiber filter, 47 mm, 1 µm, PALL 61631 or equivalent
- Centrifuge (Thermo Scientific ST-40 or equivalent), capable of reaching at least 3000 rpm
- Syringe (BD 309646 or equivalent), polypropylene/HDPE, 5 mL
- Disposable glass and plastic pipets

Solid-Phase Extraction

- Solid Phase Extraction (SPE) cartridges (Phenomenex 8B-S038-SCH, 150 mg WAX, or equivalent)
- SPE reservoirs – 60 mL, Phenomenex part# AH0-7189, or equivalent
- SPE adapter caps – Phenomenex Part# AH0-7191 (Adapter cap for 1, 3, 6mL SPE tubes)
- Vacuum manifold for SPE Cartridges – Sigma-Aldrich Cat# 57265: Visiprep SPE Vacuum manifold, or equivalent
- Disposable liners for Visiprep Manifold – Millipore-Sigma part# 57059 / Restek part# 28310-VM, or equivalent
- Vacuum tubing – 1/4” ID, 5/8” OD, 3/16” wall; Fisher Scientific part# 14-176-6B or equivalent
- Vacuum Pump – Sufficient capacity to maintain a vacuum of approximately 10 to 15 inches of mercury for extraction cartridges. Millipore model# WP6111560, 115V, 60Hz, 3.5A

Evaporation

- Automatic or manual solvent evaporation system – TurboVap® LV or equivalent
- Evaporation/concentrator tubes, 60 mL clear glass, 30 x 125 mm, without caps – Fisher cat# 02-993-275; Caps: Qorpak item # CAP-00178; Tubes with Caps: Qorpak item# GLC-07878; or equivalent

Instrument

- High-performance liquid chromatograph (HPLC) equipped with tandem quadrupole mass spectrometer – Agilent 6495C, Sciex 4500/5500, or equivalent
- Agilent Zorbax RRHD Eclipse Plus C18, 2.1 x 50 mm (1.8 µm) analytical column (Agilent Part # 959757-902), or equivalent

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- Guard cartridge/column – Phenomenex SecurityGuard cartridges (AJ0-7597), or equivalent
- Trap/delay column – Phenomenex Luna 5µm C18 100Å LC column 30 x 3mm (part# 00A-4252-Y0), or equivalent

7.2 Supplies

Due to the possibility of adsorption of analytes onto glass, HDPE containers are used for all standard, sample, and extraction preparations. Any time a new lot of SPE cartridges/tubes, solvents, cryovials, or autosampler vials are used, it must be demonstrated that a MB is reasonably free of contamination and that the criteria in Section 11.1.1 are met.

- Reference matrix: Aqueous – reagent water
- Reference matrix: Solid – Ottawa sand
- Bottles – HDPE or glass, with linerless HDPE or polypropylene caps. Various sizes. QEC item # 6212-Q016/BC-150-PACE (500 mL), 6212-Q008/BC-280-PACE (250 mL), 6213-U004/BC-500-PACE (125 mL), 6213-U002/BC-400-PACE (60 mL)
- Screw top vials, 250uL PP, and Cap, 9mm, clear, thin PP/silicone septa – used in sample analysis and pre-screening (Agilent Cat # 5190-2243 and 5191-8151), or equivalent
- Polypropylene vials – for storage (Wheaton W985872: 2mL cryovials), or equivalent
- 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
- Extract/Standard storage containers – 15-mL, 8-mL, or 4-mL narrow-mouth HDPE container - Thermo Scientific item# 2002-9050, 2002-9025, 2002-9125; 2.0-mL screw-top polypropylene cryogenic vials – Grainger item# 6EMV1;1.5-mL snap-cap polypropylene microcentrifuge tubes - Fisher item# 05-408-129; or equivalent
- Large volume conical-bottom PP centrifuge bottles – VWR Cat #89091-000 or equivalent

8.0 Reagents & Standards

NOTE: Other volumes of standards and reagents may be prepared to account for expected usage. As long as all ratios are kept constant, this is not considered a deviation from the approved procedure.

NOTE: All stored reagents and standards must be labeled as required by the Preparation and Documentation of Laboratory Standards and Reagents SOP [QA SOP ENV-SOP-WCOL-0083], the Contingency and Emergency Preparedness Plan [HS SOP ENV-SOP-WCOL-0015], the Safety Manual [Corp Manual COR-MAN-HSE], and the Laboratory Quality Manual [ENV-MAN-WCOL-0001].

NOTE: Reagents may be purchased from any approved vendor that can provide a certificate of analysis. All standards must be prepared using certified reference materials. Follow manufacturer expiration date unless stated otherwise below.

8.1 Reagents

Reagents prepared by the laboratory may be stored in either glass or HDPE containers. Proper cleaning procedures (Section 3) must be followed prior to using the containers.

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- Acetic acid – ACS grade or equivalent, store at room temperature; Fisher cat# A38C-212 or equivalent
    - Acetic acid (0.1%) - dissolve acetic acid (1 mL) in reagent water (1 L), store at room temperature, replace after 3 months
- Acetonitrile – UPLC grade or equivalent, verified before use, store at room temperature; Fisher A996-4 or equivalent
- Ammonium acetate – LC/MS grade or equivalent, store at 2-8° C, replace 2 years after opening date; Fisher A637-500 or equivalent
- Ammonium hydroxide – certified ACS+ grade or equivalent, 30% in water, store at room temperature; Fisher A470-250 or equivalent
    - Aqueous ammonium hydroxide (3%) – add ammonium hydroxide (10 mL, 30%) to reagent water (90 mL), store at room temperature, replace after 3 months
    - Methanolic ammonium hydroxide (0.3%) – add ammonium hydroxide (1 mL, 30%) to methanol (99 mL), store at room temperature, replace after 1 month
    - Methanolic ammonium hydroxide (1%) – add ammonium hydroxide (3.3 mL, 30%) to methanol (97 mL), store at room temperature, replace after 1 month
    - Methanolic ammonium hydroxide (2%) – add ammonium hydroxide (6.6 mL, 30%) to methanol (93.4 mL), store at room temperature, replace after 1 month
- Carbon – EnviCarb® 1-M-USP or equivalent, verified by lot number before use, store at room temperature. Sigma 57210-U
- Eluent B – Acetonitrile, Ultra LCMS grade or equivalent; Fisher A996-4 or equivalent
- Eluent A – 2 mM ammonium acetate in 95:5 water/acetonitrile. Aliquot 0.4 mL of aqueous 5M ammonium acetate in 949.6 mL of water and 50 mL of acetonitrile. Alternatively, dissolve 0.154 g of neat ammonium acetate into 950 mL of water and 50 mL of acetonitrile. Store at room temperature, shelf life is 2 months.
- Formic acid – greater than 96% purity or equivalent, store at room temperature; Acros 147930010 or equivalent
    - Formic acid (aqueous, 0.1 M) – dissolve formic acid (4.6 g / 3.77 mL) in reagent water (1 L), store at room temperature, replace after 2 years
    - Formic acid (aqueous, 0.3 M) – dissolve formic acid (13.8 g / 11.31 mL) in reagent water (1 L), store at room temperature, replace after 2 years
    - Formic acid (aqueous, 5% v/v) – mix 5 mL formic acid with 95 mL reagent water, store at room temperature, replace after 2 years
    - Formic acid (aqueous, 50% v/v) – mix 50 mL formic acid with 50 mL reagent water, store at room temperature, replace after 2 years
    - 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.

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- Methanol – HPLC grade or better, 99.9% purity, store at room temperature; Fisher A452-4 or equivalent
- Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid – add ammonium hydroxide (0.33 mL, 30%), reagent water (0.167 mL) and acetic acid (0.0625 mL) to methanol (9.44 mL), store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank (Section 11.2.1) and sample extract dilutions.
- Reagent water – Laboratory reagent water, test by lot/batch number for residual PFAS content.

8.2 Standards

Prepare standard solutions 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. If the chemical purity is 98% or greater, the weight may be used without correction to calculate the concentration of the standard.

When not being used, store standard solutions in the dark at 4 °C, unless the vendor recommends otherwise, in tightly sealed screw-capped vials. Place a mark on the vial at the level of the solution so that solvent loss by evaporation can be detected. Replace the solution if solvent loss has occurred.

Note: ^{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.

The laboratory must maintain records of the certificates for all standards for traceability purposes. Copies of the certificates should be provided as part of the data packages in order to check that proper calculations were performed.

- **Extracted Internal Standard (EIS)**

  Isotopically labeled compounds; prepare the EIS solution containing the isotopically labeled compounds listed in Table 2 as extracted internal standards in methanol from stock standards. An aliquot of EIS solution is added to each sample prior to extraction. The list of isotopically labeled compounds in Table 2 represents the compounds that were available at the time this method was validated. Other isotopically labeled compounds may be used as they become available. Prepare the EIS Standard according to the table below:

Component	Aliquot for 2.2 mL Prep	Aliquot for 6.6 mL Prep
MPFAC-HIF-ES	1.1 mL	3.3 mL
Methanol	1.1 mL	3.3 mL

- **Non-Extracted Internal Standard (NIS)**

  Prepare the NIS solution containing the isotopically labeled compounds listed in Table 2 as non-extracted internal standards in methanol from stock standards. An aliquot of NIS solution is added to each sample prior to instrumental analysis. Prepare the NIS Standard using the Wellington Laboratories stock, according to the table below:

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Component	Aliquot for 2.2 mL Prep	Aliquot for 6.6 mL Prep
MPFAC-HIF-IS	1.1 mL	3.3 mL
Methanol	1.1 mL	3.3 mL

- **Native Standards Solutions**

  Prepare spiking solutions containing the method analytes listed in Table 3 in methanol from Wellington stock standards. The solution(s) 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 method analytes if they are commercially available. Currently, these include PFOS, PFHxS, NMeFOSAA, and NEtFOSAA. Prepare the Primary Dilution Standards (PDS) according to the table below. A set of 10X-dilute PDS solutions (10X PDS A, 10X PDS B, 10X PDS C, 10X PDS D) is then created from the original PDS solutions, as noted below the table. Finally, a separate PDS solution is prepared according to the table below and used for Initial Calibration Verification purposes. This ICV PDS is prepared either from a separate, second source (or separate manufacturer lot) than that used for the original PDS/10XPDS solutions. If a second source or lot is unavailable, a separate preparation using the same stocks is acceptable.

All values in mL	PDS A	PDS B	PDS C	PDS D
PFAC-MXH	1.1			
PFAC-MXI	1.1			
PFAC-MXJ		1.1		
PFAC-MXF			1.1	
PFAC-MXG				1.1
Methanol[1]	0.55	1.1	0.275	1.65
Final Volume	2.75	2.2	1.375	2.75

Note: PDS B and PDS C should routinely be prepared at double volume (4.4 mL and 2.75 mL, respectively) to support preparation of the ICAL standard set. 10X PDS Mixes are prepared by diluting 200 µL each of PDS A, B, C, and D with 1.2 mL of MeOH for a final volume of 2 mL. Alternately, create four separate solutions by diluting 200 µL of PDS A, B, C, or D with 1.8 mL of MeOH for a final volume of 2 mL each. The ICAL L1-L4 solutions described below are prepared using a single 10X PDS solution.

- **ICV PDS Preparation** – Prepare ICV standards using the Absolute Standards 1633 PFC Mix (catalogue # 63735), following the tables below.

All values in µL	ICV PDS
1633 PFC Mix	100
Methanol[1]	900
Final Volume	1000

[1] *Methanolic Ammonium Hydroxide (1%)*

- **ICV Standard Preparation** – prepare the final ICV analytical standard using the ICV PDS and following the table below:

Component	Aliquot for ICV STD (µL)

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ICV PDS	10
EIS	20
NIS	20
Water	80
Acetic Acid	12.5
Methanol[1]	1857.5
Final Volume	2000

[1] *Methanolic Ammonium Hydroxide (1%)*

- **Calibration Standard Solutions**

  A series of calibration solutions containing the target analytes and the EIS and NIS is used to establish the initial calibration of the analytical instrument. The concentration of the method 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 methanolic ammonium hydroxide (1%), water, acetic acid and the method analyte and isotopically labeled compound standard solutions. After dilution, the final solution will match the solvent mix of sample extracts, which contain methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid (Section 8.1). Calibration standard solutions do not undergo solid phase extraction/cleanup. Prepare the calibration standard solutions according to the table below:

Component[1]	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
10X PDS MIX	12.5	25	62.5	156.25						
PDS A/B/C/D					31.25	62.5	156.25	312.5	625	781.25
EIS	50	50	50	50	50	50	50	50	50	50
NIS	50	50	50	50	50	50	50	50	50	50
Water	200	200	200	200	200	200	200	200	200	200
Acetic Acid	31.25	31.25	31.25	31.25	31.25	31.25	31.25	31.25	31.25	31.25
Methanol[2]	4656.25	4643.75	4606.25	4512.5	4543.75	4418.75	4043.75	3418.75	2168.75	1543.75
Final Volume	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

[1] *All values listed are µL*

[2] *Methanolic Ammonium Hydroxide (1%)*

Concentrations for calibration solutions are presented in Table 3. A minimum of six contiguous calibration standards are 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 LOQ to the highest calibration standard). If a second- order calibration model is used, then a minimum of seven calibration standards are 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 and be at a concentration less than or equal to the Limit of Quantitation (LOQ). All initial calibration requirements listed in Section 9.2 must be met.

Note: Additional calibration standards, at levels lower than the lowest calibration standard listed in the method, may be added to accommodate a lower limit of quantitation if the instrument sensitivity allows. Calibration standards at the high end of the calibration may be eliminated if the linearity of the instrument is exceeded or at the low end if those calibration standards do not meet the S/N ratio criterion of 3:1, so long as the required number of calibration points is met.

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All analytes with commercially available stable isotope analogues must be quantified using isotope dilution.

- **Qualitative Standards**

  Standards that contain mixtures of the branched and linear isomers of the method analytes and that are used for comparison against suspected branched isomer peaks in field samples. These qualitative standards are not required for those analytes where the quantitative standards in Section 8.2 already contain the branched and linear isomers. Qualitative standards that are currently commercially available include PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE. Create an intermediate standard containing all the qualitative standards at a concentration of 1 µg/mL (40uL of each stock into 2mL FV in MeOH) and use that to prepare the check standard according to the table below. Use the following Wellington Laboratories catalogue items to prepare the intermediate standard: T-PFOA, P355TMHxA (PFNA isomer), P4MOA (PFNA isomer), ipPFNA, br-FOSA, br-NMeFOSA, br-NEtFOSA, br-NMeFOSE, br-NEtFOSE.

Component	Aliquot for Isomer Check STD (µL)
Isomer Intermediate STD	20
EIS STD	20
NIS STD	20
Water	80
Acetic Acid	12.5
Methanol[1]	1847.5
Final Volume	2000

- **Instrument Blank**

  A solvent blank is analyzed at the beginning of each analytical sequence, to demonstrate clean instrumental background, and after samples containing high levels of target compounds (e.g., calibration, CCV) to monitor carryover from the previous injection. The instrument blank consists of clean reagent fortified with the EIS and NIS for quantitation purposes. Prepare the IBLK using Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid solution and an appropriate volume of EIS and NIS; alternatively, prep the IBLK from 934 uL of 1% Methanolic ammonium hydroxide, 40 uL of reagent water, 6.25 uL of acetic acid, and 10 uL each of EIS and NIS.

- **Bile Salts Check Standard containing Taurodeoxycholic Acid (TDCA)**

  TDCA is used to evaluate the chromatographic program relative to the risk of an interference from bile salts in samples. A solution is prepared at a concentration of 10 ng/mL in the same solvent as the calibration standards and is analyzed with each calibration and at the beginning of each analytical sequence Using Cayman Chemical item# 15935 (or equivalent), create a stock standard and use it to create an intermediate standard with a concentration of 1 µg/mL. Use the intermediate standard to prepare the Bile Salts Check Standard according to the table below.

Component	Aliquot for Bile Salts Check STD (µL)
Intermediate TDCA Standard	100
EIS STD	100

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NIS STD	100
Water	400
Acetic Acid	62.5
Methanol[1]	9237.5
Final Volume	10000

[1] *Methanolic Ammonium Hydroxide (1%)*

9.0 PROCEDURE

9.1 Equipment Preparation

9.1.1 Support Equipment

Incubators, water baths, refrigerator units, freezer units, bottle top dispensers, pipettes, thermometers, and ovens are maintained and verified as required by the Equipment and Instrumentation SOP [QA SOP ENV-SOP-WCOL-0080].

The balance is verified at the beginning of each analytical day using a certified weight set. Refer to the Equipment and Instrumentation SOP [QA SOP ENV-SOP-WCOL-0080] for balance verification procedures and acceptance criteria.

9.1.2 Instrument Set Up

9.1.2.1 Routine Instrument Operating Conditions

All maintenance activities are listed in daily maintenance logs that are assigned to each instrument.

9.2 Calibration

Mass Calibration – The mass spectrometer must undergo mass calibration to ensure accurate assignments by the instrument. This mass calibration must be performed at least annually 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 instrument 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. The procedures used for mass calibration and mass calibration verification must evaluate an ion range that encompasses the ion range (Q1 and Q2 m/z) of the analytes of interest of this method.

Mass Calibration Verification – A mass calibration verification must be performed following mass calibration, prior to standard and sample analyses. Mass verification checks must also be performed after any subsequent mass calibrations. The laboratory must follow the instructions for the individual instrument software to confirm the mass calibration, mass resolution and peak relative response. Mass calibration verification must be performed using standards whose mass range brackets the masses of interest (quantitative and qualitative ions). Check the instrument mass resolution to ensure that it is at least unit resolution. Unit resolution is demonstrated when the value of the peak width at half-height is within 0.5 ± 0.1 amu or Da.

Multiple Reaction Monitoring (MRM) is required to achieve better sensitivity with the mass spectrometer than full-scan analysis. The ions to be monitored (quantitation and confirmation

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transitions, also referred to as precursor and product ions) for each native compound, EIS, and NIS are given in Table 2.

The chromatographic conditions should be optimized for compound separation and sensitivity. The same optimized operating conditions must be used for the analysis of all standards, blanks, IDOCs, MDL and LCS standards, and samples. 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.

Retention Time (RT) calibration – After RT windows have been empirically confirmed for each analyte, once per ICAL and at the beginning of the analytical sequence, the position of each method target analyte, EIS analyte, and NIS analyte peak shall be set using the midpoint standard of the ICAL curve when ICAL is performed. When ICAL is not performed, the initial CCV retention times or the midpoint standard of the ICAL curve can be used to establish the RT window position.

Native target analyte, EIS analyte, and NIS analyte RTs must fall within 0.4 minutes (24 sec) of the predicted retention times from the midpoint standard of the ICAL or initial daily CCV, 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 standard must fall within in the retention time window for that analyte.

For all target analytes with exact corresponding isotopically labeled analogs, target analyte peaks must elute within ±0.1 minutes (±6 sec) of the associated EIS.

When establishing the chromatographic conditions, it is important to consider the potential interference of bile salts during analyses of samples. Inject the Bile Salt Check standard (Sections 8.2., 9.2.3) during the retention time calibration process and adjust the conditions to ensure that TDCA does not coelute with any of the target analytes, EIS, or NIS standards. Analytical conditions must be set to allow a separation of at least 1 minute between TDCA and PFOS.

9.2.1 Calibration Design

Prior to the analysis of samples, and after the mass calibration check has met all criteria in Section 9.1.2, each LC-MS/MS system must be calibrated at a minimum of 6 standard concentrations (Section 8.2 and Table 3). This method procedure calibrates and quantifies 40 PFAS target analytes, using the isotopically labeled compounds added to the sample prior to extraction, by one of two approaches:

- Isotope Dilution quantification (ID), whereby the response of the target compound 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 compound 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.

Initial calibration is performed using a series of at least six solutions, with the concentrations of at least five of the six calibration standards being within the quantification

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range. If a second-order calibration model is used, one additional concentration is required. The initial calibration solutions contain the entire suite of EIS, NIS, and target compounds. Calibration is verified at least once every ten field samples with a calibration verification (CV/CCV) standard, performed 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 is the minimum number of calibration standards that must be used in the initial calibration; however, the laboratory may use more standards, as long as the criteria in Section 9.2.3 can be met.

Each LC-MS/MS system must be calibrated whenever the laboratory takes corrective action that might change or affect the initial calibration criteria, or if either the CCV or ISC acceptance criteria have not been met.

9.2.2 Calibration Sequence

Calibration standards must be analyzed in sequence from lowest to highest concentration to minimize the chance that carryover from a higher concentration standard will boost the area of a lower concentration standard. A typical sequence for days when calibration is required is shown below.

Description[1]	Comment
ICAL L1	
ICAL L2	
ICAL L3	
ICAL L4	
ICAL L5	
ICAL L6	
ICAL L7	
ICAL L8	
ICAL L9	
ICAL L10	
IBLK	Must be <1/2 LOQ
ICV	%R must be 70 – 130%
ISOMER CHECK	
BILE SALTS CHECK	TDCA must be resolved by ≥1 min from PFOS
CCV (ISC)	%R must be 70-130%; begins and ends Analytical Sequence

[1]*See Table 3 for calibration concentrations.*

9.2.3 Calibration Evaluation

If the 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. All initial calibration criteria must be met before any samples or required blanks are analyzed.

Instrument Sensitivity – Sufficient instrument sensitivity is established if a signal-to-noise ratio ≥ 3:1 can be achieved when analyzing the lowest concentration standard within the quantitation range that the laboratory includes in its assessment of calibration linearity (see Table 3).

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9.2.3.1 Curve Fit

One of the following two approaches must be used to evaluate the linearity of the instrument calibration. Weighting (typically 1/x or 1/x2) is allowed for linear and non-linear regressions. If a weighted or non-weighted regression is used, it may not be forced through zero.

If these criteria cannot be met, the analyst will have difficulty meeting ongoing QC criteria. It is recommended that corrective action is taken to reanalyze the ICAL standards, restrict the range of calibration, or select an alternate method of calibration.

If more than the minimum number of standards are analyzed and levels are excluded from the calibration, only the lowest or highest standards may be excluded, except as noted here. The removal of calibration levels from the interior of the curve is allowed only when there is sound technical reason for doing so and when the level is removed for all analytes; for example, when it can be proven that the wrong standard was analyzed for the calibration level or there is obvious evidence that the instrument malfunctioned during injection of the standard. The removal of any calibration level from the interior of the curve must be approved by the department supervisor/manager. Management approval and the rationale for the level removal must be documented and kept with the technical record.

Replacing a calibration standard may sometimes be needed to correct for a technical problem that occurred during analysis such as power failure, incomplete injection of the standard, or a similar situation. Replacement of one standard, when analyzed within 24 hours of original analysis time and replacing all analytes in the original standard, is permitted. The replacement of the standard must be approved by the department supervisor/manager; approval and the reason for replacement must be documented and kept with the technical record.

9.2.3.2 Relative Error

Option 1: Calculate the relative standard deviation (RSD) of the RR or RF values of the initial calibration standards for each native compound and isotopically labeled compound. The RSD must be ≤ 20% to establish instrument linearity.

Option 2: Calculate the relative standard error (RSE) of the initial calibration standards for each native compound and isotopically labeled compound. The RSE for all method analytes must be ≤ 20% to establish instrument linearity.

9.2.3.3 Initial Calibration Verification

As part of the IDOC, each time a new Analyte PDS is prepared, and once after each ICAL, analyze an ICV sample prepared from a second source (different from the source of the ICAL standards). If a second vendor is not available, then a different lot of the standard from the same vendor should be used. The ICV should be prepared and analyzed just like a CCV. Acceptance criteria for the ICV are identical to the CCVs: the calculated concentration for each analyte must be within ± 30% of the expected value. If measured analyte concentrations are not of acceptable accuracy, correct the problem and rerun the ICV. If the problem

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persists, repeat the ICAL. Samples are not to be analyzed until the ICAL has been verified by acceptable ICV accuracy. The lab will add additional target analytes to the ICV mix as second source standards become commercially available.

Qualitative Isomer Check – Calibration standards for PFOS, PFHxS, NMeFOSAA and NEtFOSAA contain both branched and linear isomers. For target compounds which have multiple chromatographic peaks due to branched and linear isomers, but for which quantitative standards are not available, a qualitative isomer check is analyzed with each calibration event and at the beginning of each analysis sequence to demonstrate the peak shape and retention time of the branched isomers. See Section 10.1 for integration information.

Bile Salts Check – The laboratory must analyze a Bile Salts Check standard (Section 8.2) after the initial calibration, and prior to the analysis of samples, to check for interferences caused by bile salts. If an interference is present, the chromatographic conditions must be modified to eliminate the interference from TDCA (e.g., changing the retention time of TDCA such that it is resolved from PFOS by at least one minute), and the initial calibration repeated. This requirement only applies when analyzing tissue samples and/or when following DoD QSM Table B-24 prescriptions.

9.2.3.4 Continuing Calibration Verification

After a passing MS resolution and a successful initial calibration is achieved and prior to the analysis of any samples, the calibration is verified by injecting an aliquot of the appropriate concentration ICAL standard, analyzed with the same conditions used during the ICAL. CCV is performed at the beginning of each analytical sequence (fulfilled by the Instrument Sensitivity Check; see below), after every ten samples, and at the end of the analytical sequence. In this context, a “sample” is defined as a field sample. MBs, CCVs, LCSs, MSs, FDs, TBs and MSDs are not counted as samples. All CCV analyses are performed using the mid-level ICAL standard, except for the daily Instrument Sensitivity Check, as noted below.

Calculate concentration for each native and EIS compound in the CCV using the equation in Section 10.3. The recovery of native and EIS compounds for the CCVs must be within 70 – 130%. If the CCV criteria are not met, recalibrate the LC-MS/MS according to Section 9.2. Alternately, the analyst may immediately analyze two CCVs for confirmation. If both confirmation CCV analyses meet the recovery criteria, analysis may proceed; however, the analyst must rerun any samples that were analyzed after the failing CCV and before the 2 passing CCVs. If either of the 2 confirmation CCV analyses fails to meet the acceptance criteria, recalibrate the LC-MS/MS according to Section 9.2.

If an individual target compound recovery in a CCV is above the upper control limit and all associated samples are ND for that compound, the data for those samples may be reported. In such cases, a narrative statement must be included in the report indicating the specific compound result that was biased high in the CCV, and that samples were ND for that compound and thus reportable.

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Instrument Sensitivity Check (ISC) – An ISC at the concentration of the lowest calibration standard within the quantitation range is required to be analyzed at the beginning of the analytical run (Section 9.4). The signal-to-noise ratio (Section 10.1.1) of the ISC must be greater than or equal to 3:1. Recovery of the native and EIS compounds for the ISC must be within 70-130%. If the requirements cannot be met, the problem must be corrected before analyses can proceed.

9.3 Sample Preparation

This section describes the sample preparation procedures for aqueous samples with <100 mg/L Suspended Solids (Section 9.3.3) and solid samples (soil, sediment or biosolid; Section 9.3.4). For solid samples and aqueous samples that contain particles, percent solids are determined using the procedures in Section 9.3.2. This section also describes the solid phase extraction (SPE, Section 9.3.5) and extract cleanup protocols for all matrices (Sections 9.3.6 – 9.3.7).

Note: The laboratory may choose to pre-screen some samples prior to performing the analysis, following the protocol described in Appendix C. For aqueous samples, use the secondary container provided for suspended solids to perform the pre-screening. If high levels of PFAS are present in the sample, a lower volume is required for analysis.

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.

9.3.1 Homogenization & Subsampling

The laboratory may subsample the aqueous samples as described in Appendix D; however, subsampling must meet project-specific requirements. The laboratory must notify the client that subsampling has occurred. Subsampling is acceptable for samples which exceed the 100 mg/L SS method application limit, samples which require greater than a 10X dilution for over-range detections or are known/expected to be highly contaminated, and samples which fail the acceptance criteria for EIS compounds (see Section 9.4.2). Any time subsampling is required, no less than 2% of the typical extracted volume (or mass) may be subsampled. In cases where less than 2% of an aqueous sample is required for subsample (i.e., less than 10 mL, or less than 2 mL for leachates), serial dilution must be employed.

9.3.2 Determination of Percent Solids

Percent solids analysis must be performed on all solid samples prior to preparation and analysis. Determination of Suspended Solids (SS) in aqueous samples may be omitted based on visual inspection of the sample by a trained analyst. If, upon visual inspection, an aqueous sample contains SS at a level the analyst deems likely to clog the SPE cartridge, that sample shall be centrifuged following the procedures in Appendix F. Alternatively, the procedure in the following paragraph may be followed.

Suspended Solids in aqueous liquids and multi-phase samples consisting of mainly an aqueous phase – aqueous samples will be logged in for both DM1633 and TSS analysis. The TSS analysis will follow the Method SM2540D protocol, with the analyst filtering ≥50 mL of aqueous sample, and the LOQ being adjusted accordingly. This should provide an LOQ of ≤100 mg/L. Any aqueous sample returning a SS content of >100 mg/L shall be

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diluted following the prescriptions in Section 9.4.2. Samples containing 100-499 mg/L SS will be subsampled and prepared at a 5X dilution; samples containing 500-999 mg/L SS will be subsampled and prepared at a 10X dilution; samples containing 1000-1999 mg/L will be subsampled and prepared at a 20X dilution. If a sample contains SS ≥2000 mg/L, continue the dilution series for 50, 100, 200, 500, 1000, or 2000X dilutions, as needed. If an aqueous sample contains >20,000 mg/L SS, the lab should contact the client and consider resampling or preparing by alternate means (i.e., as a biosolid).

Percent Solids in solid samples (excluding tissues) – Along with DM1633, all solid samples will be logged in for both a percent solids analysis following SM2540 and a pre-extraction percent solids check following the protocol below. The percent solids check will be used to guide solid sample processing (see Section 9.3.4).

- Weigh 5 to 10 g of sample to three significant figures (0.01 g) in a tared crucible
- Dry a minimum of 12 hours at 110 ± 5 °C. Cool in a desiccator.
- Weigh beaker with dried sample. Calculate percent solids using the equation below:

$$\%\ solids = \frac{weight\ of\ sample\ aliquot\ after\ drying\ (g)}{weight\ of\ sample\ aliquot\ before\ drying\ (g)}\ x\ 100$$

9.3.3 Aqueous Sample Processing

This method is applicable to aqueous samples containing up to 100 mg/L SS per sample. Therefore, aqueous sample preparation cannot begin until the analyst has visually inspected each sample and determined the best protocol for each sample, as discussed above. TSS analysis may or may not be part of that protocol. This procedure requires the preparation of the entire sample. Smaller sample volumes may be analyzed for samples containing SS greater than specified for this method, or when unavoidable due to high level of PFAS. Typical sample size is 500 mL; however, sample size may vary, depending on project requirements, applicable regulations, and sample characteristics. The sample is to be analyzed in its entirety and should not be filtered. Leachate samples are analyzed using a 100 mL sample volume. Therefore, they must not be included in the same sample preparation batch as aqueous samples analyzed using 500 mL sample volumes.

Homogenize the sample by inverting the sample 3 – 4 times. Do not filter the sample. The standard procedure is to analyze the entire sample, plus a basic methanol rinse of the container. Refer to Appendix F for container rinse protocols for aqueous samples requiring centrifugation.

The volume of the aqueous sample analyzed is determined by weighing the full sample bottle and then the empty sample bottle. Weigh each sample bottle (with the lid) to the nearest 0.1 g. For aqueous samples requiring centrifugation, sample volume should be measured following the protocols in Appendix F.

Prepare a method blank and two LCSs using PFAS-free water in HDPE bottles. Select a volume of water that is typical of the samples in the batch. Spike one LCS sample with native standard solution at 2x the LOQ (25 µL each of 10XPDS A/B/C/D). This aliquot

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(LLLCS) will serve to verify the LOQ. Spike the other LCS sample at a concentration near the mid-level calibration point (30 µL each of PDS A/B/C/D). This aliquot will serve as the traditional LCS. If any of the samples in an extraction batch require centrifugation, the batch QC samples (MB, LLLCS, LCS) must also be taken through the same protocols, including sample transfer, centrifugation, and container rinsing protocols.

Note: If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples with native standard solution (Section 8.2) at a concentration equivalent to the mid-level calibration point.

Spike a 50 µL aliquot of EIS solution (Section 8.2) 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 or inverting the sample container.

Check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid (Section 8.1) or ammonium hydroxide (or with 5% formic acid and 3% aqueous ammonium hydroxide). The sample is now ready for solid-phase extraction (SPE) and cleanup (Sections 9.3.5). Analyst must make sure to record extraction manifold ID# and manifold position for each QC sample and field sample being extracted.

9.3.4 Solid Sample (excluding tissues) Processing

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. Mix the sample thoroughly, stirring from the bottom to the top and in a circular motion along the sides of the jar, breaking particles up 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 as per Section 9.3.2.

Note: The target sample weight for sediment or soil is 5 g dry weight. The target sample weight for biosolids is 0.5 g dry weight. Small amounts of reagent free water used for method blanks (10% of sample weight or less) can be added to unusually dry samples. This is an option, not a requirement.

Check the LIMS system for the percent solids check data associated with the samples to be prepared. Using the percent solids check data and the calculation below, weigh out an aliquot of each solid sample, not dried, into a 50 mL polypropylene centrifuge tube. Sample mass should be within ±0.2 g of target mass for soil and sediment samples, and within ±0.02 g of target mass for biosolids samples. Sample aliquot should provide 5 g dry weight (WiDry below) for soil and sediment or 0.5 g dry weight for biosolids. Because biosolid samples are analyzed with a 0.5 g sample mass, they must not be included in the same sample preparation batch as solid samples analyzed with 5 g sample masses.

$$Solid\ Sample\ Target\ Mass\ (g) = \frac{Wi_{Dry}\ (g)}{\%\ solids\ (decimal)}$$

Prepare batch QC samples using 5 g of reference solid (Section 7.2) wetted with 2.5 g of reagent water for the method blank and two LCSs (use 0.5 g of reference solid with 0.25 g of reagent water for biosolid extraction batches). The addition of reagent water to the sand provides a matrix closer in composition to real-world samples. Spike one LCS

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sample with native standard solution at 2x the LOQ (25 µL each of 10XPDS A/B/C/D). This aliquot (LLLCS) will serve to verify the LOQ. Spike the other LCS sample at a concentration near the mid-level calibration point (30 µL each of PDS A/B/C/D). This aliquot will serve as the traditional LCS.

Note: If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples with native standard solution (Section 8.2) at a concentration equivalent to the mid-level calibration point.

Spike a 50 µL aliquot of EIS solution (Section 8.2) directly into each centrifuge tube containing the aliquoted field and QC samples. Vortex or shake the sample to disperse the standard and allow to equilibrate for approximately 30 minutes.

Add 10 mL of 0.3% methanolic ammonium hydroxide (Section 8.1) to each centrifuge tube. Vortex to disperse, then shake for 30 minutes on a variable speed mixing table. Centrifuge at 2800 rpm for 10 minutes and transfer the supernatant to a clean 50 mL polypropylene centrifuge tube.

Add 15 mL of 0.3% methanolic ammonium hydroxide 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 2800 rpm for 10 minutes and decant the supernatant from the second extraction into the centrifuge tube with the supernatant from the first extraction.

Add another 5 mL of 0.3% methanolic ammonium hydroxide to the remaining sample in each centrifuge tube. Shake by hand to disperse, centrifuge at 2800 rpm for 10 minutes and decant the supernatant from the third extraction into the centrifuge tube with supernatant from the first and second extractions.

Using a 10 mg scoop, add 10 mg of carbon (Section 8.1) to the combined extract, mix by occasional hand shaking for no more than five minutes and then centrifuge at 2800 rpm for 10 minutes. Immediately decant the extract into a 60-mL glass or plastic evaporation or concentrator tube.

Dilute to approximately 35 mL with reagent water. A separate concentrator tube marked at the 35 mL level may be kept for a visual reference to get the approximate volume, but a close accounting of all water present in the sample should be maintained by the analyst regardless. Samples containing more than 50% water may yield extracts that are greater than 35 mL in volume; therefore, do not add water to these. Adding water to the sample extract is recommended for dry solid samples. Determine the water content in the sample as follows (percent moisture is determined from the % solids):

$$Water\ Content\ in\ Sample = \frac{Sample\ Weight\ (g)\ x\ Moisture\ (\%)}{100} + water\ added\ earlier$$

Or, if the Target Solid Sample Mass equation was used and the target sample mass was aliquoted for extraction as calculated, determine the water content in the sample as follows (use 0.5 instead of 5 for biosolid samples):

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$$Water\ Content\ in\ Sample\ (g)\ =\ Recorded\ Solid\ Sample\ Mass\ (g) - 5$$

Concentrate each extract at approximately 55 ºC with a N2 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 (last paragraph of this section) should contain no more than 20% methanol. The laboratory has flexibility to modify the volumes used to achieve this goal. In some situations, the laboratory may prefer not to add water in the step above ("dilute to approximately 35mL reagent water"). The following table provides guidance to help determine the final extract volume, based on the water content of the original solid sample. A good rule of thumb is to make the "Concentrated Final Volume" 7-10 mL above the "Water Content in Sample" value.

Water Content in Sample[1]	Concentrated Final Volume
< 5 g	12 mL
5 – 8 g	12-15 mL
8 – 9 g	15-18 mL
9 – 10 g	16-19 mL

[1]Determined from the % solids results determined in Section 9.3.2, and includes any water added to the sample or extract in the steps above.

Note: Slowly concentrating extracts, in 1 mL increments, is necessary to prevent excessive concentration and the loss of neutral compounds (methyl and ethyl FOSEs and FOSAs) and other highly volatile compounds. The extract must be concentrated to remove the methanol as excess methanol during SPE clean-up results in poor recovery of C13 and C14 carboxylic acids and C10 and C12 sulfonates. If all the methanol is evaporated, the neutral compounds are likely to have poor recovery; if too much methanol is in the final concentrated extract, then the longer-chain compounds are likely to have poor recovery.

Add 40 - 50 mL of reagent water to the extract and vortex. Check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid (Section 8.1) or ammonium hydroxide (or with 5% formic acid and 3% aqueous ammonium hydroxide). The extract is now ready for solid-phase extraction (SPE) and cleanup (Sections 9.3.5 and 9.3.7).

9.3.5 Solid Phase Extraction

All matrices (including batch QC) must undergo SPE and carbon cleanup to remove interferences. The SPE cartridge conditioning and sample loading process described below is for use with all matrices; SPE cartridge elution and any additional extract treatment is matrix specific and may be found in Sections 9.3.6 and 9.3.7.

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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 isotope dilution standard recoveries are significantly higher on the reanalysis. If the laboratory can demonstrate that the carbon cleanup is detrimental to the sample analysis (by comparing results when skipping the carbon cleanup during reanalysis), then the carbon cleanup may be skipped for that specific sample. Carbon cleanup is performed prior to the SPE process for solid samples.

Pack clean silanized glass wool to half the height of the WAX SPE cartridge barrel (Section 7.1).

Set up the vacuum manifold with one WAX SPE cartridge plus a reservoir and reservoir adaptor for each cartridge for each sample and QC aliquot.

Pre-condition the cartridges by washing them with 15 mL of 1% methanolic ammonium hydroxide followed by 5 mL of 0.3M formic acid (Section 8.1). Do not allow the WAX SPE to go dry. Discard the wash solvents.

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 approximately 5 mL/min. Retain the empty sample bottle for later rinsing (Section 9.3.6 and 9.3.7). Discard eluate.

Note: For aqueous samples, in the event the SPE cartridge clogs during sample loading, first attempt to rinse and dry the clogged cartridge, following protocol in the following paragraph. The cartridge is then ready for elution. Place a second cartridge in the appropriate manifold location and pre-condition as above. Continue loading the remaining sample aliquot on the second cartridge, using the same reservoir. Proceed to next step.

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 8.1) and pass those rinses through the cartridge using vacuum. Dry the cartridge by pulling air through. Discard the rinse solution. Continue to the elution and concentration steps based on the matrix.

9.3.6 Elution, Cleanup, and Filtration of Aqueous Sample Extracts

Note: If two cartridges were used, each cartridge must separately be submitted to the elution steps described below. Elute both cartridges into the same collection tube, using 5 mL of elution solvent for each. One of the elution aliquots must be used to perform the sample bottle rinse prior to eluting the cartridge. Using a gentle stream of Nitrogen and 55 ºC water bath to concentrate the ~10 mL of combined eluate to ~5 mL, then follow the carbon cleanup and filtration steps below. This concentration step is only applicable to situations where two SPE cartridges were eluted, each with 5 mL of elution solvent.

Place clean collection tubes inside the manifold, ensuring that the extract delivery needles do not touch the walls of the tubes. Resume vacuum and ensure a proper seal is achieved. DO NOT add NIS to these collection tubes.

Add 5 mL of 1% methanolic ammonium hydroxide (Section 8.1) to the sample bottle. Cap the bottle and rotate to ensure all internal surfaces of each bottle are rinsed; avoid vigorous shaking when rinsing the 500 mL aqueous sample bottles with only 5 mL of methanol –

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any evaporation/vaporization will contribute to loss of extract here. After rinsing the inside of the sample bottle, pour the rinse from the bottle or use a plastic transfer pipette to transfer the rinse to the SPE reservoir, using it to wash the walls of the reservoir. Allow the elution solvent to soak the SPE sorbent for 2 minutes, then use vacuum to pull the elution solvent through the cartridge and into the collection tubes in a slow, dropwise manner.

Note: Air dry the empty sample bottle after the rinse is transferred. Weigh the empty bottle with the cap on and subtract that from the weight of the bottle with sample, determined in Section 9.3.3.

Add 25 µL of concentrated acetic acid to each sample eluted in the collection tubes and vortex to mix. Add 10 mg of carbon (Section 8.1) to each sample and batch QC extract, using a 10 mg scoop. Shake by hand occasionally for no more than 5 minutes. It is important to minimize the time the sample extract is in contact with the carbon. Immediately vortex (30 seconds) and centrifuge at 2800 rpm for 10 minutes.

Remove the plunger from a 5-mL polypropylene syringe and place a syringe filter (25-mm filter, 0.2-µm nylon membrane) onto the syringe; repeat to prepare one syringe for each sample in the prep batch. Add 50 µL NIS solution (Section 8.2) to a clean collection tube for each sample prepared. 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. Repeat for all samples in the prep batch. Vortex to mix and transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

Note: Avoid attaching the filter to the syringe before removing the plunger from the syringe barrel, as the syringe disk filters can be compromised by the sudden vacuum created when the plunger is removed.

9.3.7 Elution and Filtration of Solid Sample Extracts

Place a clean collection tube in the manifold rack for each sample and QC aliquot, ensuring the extract delivery needles are not touching the walls of the tubes. Resume vacuum and ensure a proper seal is achieved.

Rinse the inside of the evaporation/concentrator tube using 5 mL of 1% methanolic ammonium hydroxide (Section 8.1). Then, using a plastic transfer pipette, transfer the rinse to the SPE reservoir, washing the walls of the reservoir. Allow the elution solvent to soak the SPE sorbent for 2 minutes, then use vacuum to pull the elution solvent through the cartridge and into the collection tubes in a slow, dropwise manner.

Add 25 µL of concentrated acetic acid to each sample extract in its collection tube and swirl to mix. Remove the plunger from a 5-mL polypropylene syringe and place a syringe filter (25-mm filter, 0.2-µm nylon membrane) onto the syringe; repeat to prepare one syringe for each sample in the prep batch. Add 50 µL NIS solution (Section 8.2) to a clean collection tube for each sample prepared. 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. Repeat for all samples in the prep batch. Vortex to mix and transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

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Note: Avoid attaching the filter to the syringe before removing the plunger from the syringe barrel, as the syringe disk filters can be compromised by the sudden vacuum created when the plunger is removed.

9.4 Analysis

Analysis of sample extracts for PFAS by LC-MS/MS is performed running manufacturer's data acquisition software. The mass spectrometer is run with unit mass resolution in the multiple reaction monitoring (MRM) mode.

Perform mass calibration, establish the operating conditions (Section 9.1.2), and perform an initial calibration (Section 9.2) prior to analyzing samples.

Only after all performance criteria are met may blanks, MDLs, IPRs/LCSs, and samples be analyzed.

9.4.1 Example Analytical Sequence

After a successful initial calibration has been completed, an example analytical sequence for a batch of samples analyzed during the same analysis period is as follows. The volume injected for samples and QCs must be identical to the volume used for calibration (Section 9.2). Standards and sample extracts must be brought to room temperature and vortexed prior to aliquoting into an instrument vial to ensure homogeneity of the extract.

- Instrument Sensitivity Check / CCV
- Isomer Check Standard
- Bile Salts Check Standard
- Instrument Blank
- Method Blank
- Low-level LCS (LLLCS)
- LCS
- Samples (10 or fewer)
- CCV
- Instrument Blank
- Samples (10 or fewer)
- CCV
- Instrument Blank

If the results are acceptable, the closing calibration verification solution may be used as the opening solution for the next analytical sequence.

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If the response exceeds the calibration range for any sample, extracts are diluted as per Section 9.4.2 to bring all target 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 that sample from the undiluted analysis.

9.4.2 Sample Dilutions

If the measured concentration 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 8.1 by a factor no greater than 10x and analyze the diluted extract. If the responses for each applicable EIS in the diluted extract meet the S/N and retention time requirements in Sections 10.1.1 and 10.1.2, and the EIS recoveries from the analysis of the diluted extract are greater than 5% (uncorrected for the dilution), then the compounds associated with those EISs may be quantified using isotope dilution. Use the EIS recoveries from the original analysis to select the dilution factor, with the objective of keeping the un-adjusted EIS recoveries in the dilution above that 5% lower limit (i.e., if the EIS recovery of the affected analyte in the undiluted analysis is 50%, then the sample should not be diluted more than 10:1). To account for the dilution, adjust the EIS and NIS recoveries as well as reported compound concentrations, detection limits, and LOQs.

If the EIS responses in the diluted extract do not meet the S/N and retention time requirements listed in Sections 10.1.1 and 10.1.2, then the compound cannot be measured reliably by isotope dilution in the diluted extract. In such cases, the lab must subsample a smaller aliquot of any affected aqueous sample and dilute it to 500 mL with reagent water or prepare a smaller aliquot of soil, biosolid, or sediment sample. The reduced sample volume (or mass) chosen for the re-extraction should match the dilution applied to the original extract (i.e., if the original aqueous sample extract was analyzed at a 10X dilution, 50 mL should be subsampled for the re-extraction). To account for the dilution, adjust the reported compound concentrations, detection limits, and LOQs.

If the recovery of any isotopically labeled compound is outside of the acceptance limits (Appendix B) in the original, undiluted analysis, a diluted aqueous sample or smaller aliquot (for solids) must may be analyzed.

10.0 Data Analysis & Calculations

10.1 Qualitative Identification

A native or EIS/NIS compound is positively identified in a standard, blank, sample, or QC sample when all criteria in Sections 10.1.1 through 10.1.3 are met.

10.1.1 Signal-to-noise Ratio (S/N)

Peak responses must be at least three times the background noise level (S/N 3:1). The S/N ratio must be 10:1 if no confirmation ion is used for the analyte. If the S/N ratio is not met due to high background noise, the laboratory must correct the issue (e.g., perform instrument troubleshooting to check and if needed, replace, the transfer line, column, detector, liner, filament, etc.). If the S/N ratio is not met but the background is low, then the

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analyte is to be considered a non-detect. There must also be 10 scans acquired across the peak.

10.1.2 RT Criteria

Target analyte, EIS analyte, and NIS analyte RTs must fall within ± 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial daily CCV, 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 method analytes with exact corresponding isotopically labeled analogs, method analytes must elute within ± 0.1 minutes of the associated EIS.

10.1.3 Branched Isomer Integration

For concentrations at or above the method LOQ, the total (branched and linear isomer) quantification ion response to the total (branched and linear isomer) confirmation ion response ratio (ion ratio) must fall within ± 50% of the ratio observed in the mid-point initial calibration standard. If project-specific requirements involve reporting sample concentrations below the LOQ, the ion ratio must also fall within ± 50% of the ratio observed in the initial daily CCV.

The response of all isomers in the quantitative standards should be used to define ion ratios. In samples, the total response should include the branched isomer peaks that have been identified in either the quantitative or qualitative standard. 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 for PFBA, NMeFOSE, NEtFOSE, PFMPA, and PFMBA because suitable secondary transitions are unavailable (not detectable or inadequate S/N).

10.1.4 Qualification

If the field sample result does not meet all criteria stated in Sections 10.1.1 through 10.1.3, 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 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.

10.1.5 Manual Integration

Manual integration is sometimes necessary to correct inaccurate automated integrations but must never be used to meet QC criteria or to substitute for proper instrument maintenance and/or method set-up. To assure that all manual integrations are justified and proper all manual integrations must be performed, documented, reviewed, and approved in accordance with corporate SOP ENV-SOP-CORQ-0006, *Manual Integration.* Refer to this SOP for guidance on manual integration techniques and required procedures.

10.2 Quantitative Identification

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 NIS, as shown in Table 2, using the response ratios or response factors from the

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most recent multi-level initial calibration (Section 9.2). Other equations may be used if the laboratory demonstrates that those equations produce the same numerical result as produced by the equations below.

All results for aqueous samples will be reported in ng/L. All results for solid samples will be reported in ng/g, on a dry-weight basis, and the percent solids for each sample will be reported separately. All QC data will be reported with the sample results.

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 (Section 11.3.1) established by the laboratory through calibration of the instrument. EPA considers the terms "reporting limit," "quantitation limit," "limit of quantitation," and "minimum level" to be synonymous.

Results for each analyte found in each field sample or QC standard at or above the LOQ will be reported to 3 significant figures. Results for each analyte found in each field sample or QC standard below the LOQ will be reported as "<LOQ," where LOQ is the concentration of the analyte at the LOQ, or as required by the regulatory/control authority or permit.

Results for each analyte found in a blank at or above the MDL will be reported to 2 significant figures. Results for each analyte found in a blank below the MDL will be reported as "<MDL," where MDL is the concentration of the analyte at the MDL, or as required by the regulatory/control authority or permit.

Results for any analyte found in a sample or extract that has been diluted will be reported at the least dilute level for which the measured concentration is within the calibration range (e.g., above the LOQ for the analyte and below the highest calibration standard) and in which isotopically labeled compound recoveries are within their respective QC acceptance criteria. This may require reporting results for some analytes from different analyses.

Recoveries of all associated EIS compounds will be reported for all field samples and QC standards.

10.3 Calculations

See the Laboratory Quality Assurance Manual for equations for common calculations.

For the native analytes:

$$\boldsymbol{Concentration\ (ng/L\ or\ ng/g) = \frac{Area_N M_{EIS}}{Area_{EIS}(RR\ or\ RF)}\ x\ \frac{1}{W_S}}$$

Where:

AreaN = The measured area of the Q1 m/z for the native (unlabeled) PFAS

AreaEIS = The measured area at the Q1 m/z for the EIS. See note below.

MEIS = The mass of the EIS added (ng)

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(RR) = Average response ratio used to quantify target compounds by the isotope dilution method

(RF) = Average response ratio used to quantify target compounds by the extracted internal standard method

WS = Sample volume (L) or dry weight (g)

And for the EIS analytes:

$$Concentration\ (ng/L\ or\ ng/g) = \frac{Area_{EIS} M_{NIS}}{Area_{NIS} RF_S}\ x \frac{1}{W_S}$$

Where:

$Area_{EIS}$ = The measured area at the Q1 m/z for the EIS

$Area_{NIS}$ = The measured area of the Q1 m/z for the non-extracted internal standard (NIS)

M_{NIS} = The mass of the added non-extracted internal standard (NIS) compound (ng)

W_S = Sample volume (L) or dry weight (g)

RF_S = Average response factor used to quantify the isotopically labeled compound by the non-extracted internal standard method

Results for native compounds are recovery corrected by the method of quantification. Extracted internal standard (EIS) recoveries are determined similarly against the non-extracted internal standard (NIS) and are used as general indicators of overall analytical quality.

11.0 Quality Control & Method Performance

11.1 Quality Control

Prepare the following QC samples with each batch of samples. Refer to Appendix B for acceptance criteria and required corrective action(s).

QC Check	Acronym	Frequency
Method Blank	MB	1 per batch of 20 or fewer samples.
Laboratory Control Sample / Ongoing Recovery and Precision Standard	LCS / OPR	1 per batch of 20 or fewer samples.
Low-Level Laboratory Control Sample / Low-Level Ongoing Recovery and Precision Standard	LLLCS / LLOPR	1 per batch of 20 or fewer samples.
Matrix Spike	MS	1 per batch of 20 or fewer samples.
Matrix Spike Duplicate	MSD	1 per batch of 20 or fewer samples.
Sample Duplicate	SD	1 per AFFF sample

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Extracted Internal Standard	EIS	All CAL standards, batch QC and field samples.
Non-extraction Internal Standards	NIS	All CAL standards, batch QC and field samples.

The minimum quality control requirements of this method 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., soils, biosolids, sediments), the appropriate alternative reference matrix (Section 7.2) is substituted for the reagent water matrix in all performance tests.

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 11.4.

Analyses of method blanks (MBs) 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. The procedures and criteria for analyses of a MBs are described in Section 11.1.1.

The laboratory must spike all samples with isotopically labeled compounds to monitor method performance. This procedure is described in Section 11.3. 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 9.4.2.

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 (LCS), spiked at low (LLLCS) and mid-level, and blanks. These procedures are given in Sections 9.2.4 and 11.1.2.

11.1.1 Method Blank (MB)

A method blank is analyzed with each extraction batch 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 or solids matrix blank [Section 7.2]).

Analyze the cleaned extract (Sections 9.3.6, 9.3.7) of the method blank aliquot before the analysis of the LCSs (Section 11.1).

If any PFAS is found in the MB 1) at a concentration greater than the LOQ for the analyte, 2) at a concentration greater than one-third (5% for Wisconsin) of 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, samples affected by

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the blank must be re-extracted and analyzed, provided enough sample volume is available and the samples are still within holding time.

Note: For DoD (B-24) compliance, MBs must not show any analytes detected >½ LOQ, > 1/10th the amount measured in any associated sample, or 1/10th the regulatory limit, whichever is greatest.

If continued re-testing results in repeated blank contamination, 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.

11.1.2 Laboratory Control Sample (LCS)/Ongoing Precision and Recovery (OPR)

Analyze the extract of the LCS/OPR to ensure the analytical process is under control.

Compute the percent recovery of the native compounds by the appropriate quantification method depending on the compound (Sections 9.2.1, 10.2, 10.3). Compute the percent recovery of each isotopically labeled compound by the non-extracted internal standard quantitation method and the equation below:

$$Recovery\ \% = \frac{Concentration\ Found\ (ng/mL)}{Concentration\ Spiked\ (ng/mL)}\ x\ 100$$

For the native compounds and isotopically labeled compounds, compare the recovery to the LCS limits. Analyte recoveries must be within in-house limits if project limits are not provided; otherwise, project limits must be met. Preliminary in-house acceptance criteria of 40-150% must be used for LCS analyses until in-house limits are generated in accordance with Section 14.5.4 of EPA Draft Method 1633. The lower in-house acceptance criteria for LCS recovery cannot be <40%.

If all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and 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 extraction batch and repeat the ongoing precision and recovery test.

11.1.3 Matrix Spike (MS)

Analysis of an MS may be required in each extraction batch. Assessment of method precision can be accomplished by preparation and analysis of a matrix spike duplicate (MSD). See Appendix E for MS/MSD, MS/FD sample selection guidance.

Note: For DoD (B-24) compliance, one MS/MSD pair is required per preparatory batch. For all other regulatory programs, follow project- or client-specific requirements.

Within each extraction batch, a minimum of one pair of sample bottles is spiked as MS/MSD for every 20 samples analyzed. MS/MSD samples are spiked in the same manner as the mid-level LCS.

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Analyte recoveries may exhibit matrix effect. For matrix spike samples, acceptance criteria for recovery should match LCS limits. If the % recovery falls outside of the acceptable range, corrective action must occur. The initial corrective action will be to check all calculations. If the calculations are correct, check the recovery of that analyte in the LCS. If the recovery of the analyte in the LCS is within limits, then matrix interference has been demonstrated and the laboratory operation may proceed. Analytical reports will show qualifier flags in such cases.

If the recovery for any analyte is outside the acceptance criteria for the matrix spike and the LCS, the laboratory is out of control and corrective action will be taken. Corrective action may include repreparation and reanalysis of the batch. A narrative statement will be added to document the corrective action taken.

RPDs for MS/MSDs should be ≤30%. If the RPD falls outside of the acceptable range, corrective action must occur. The initial corrective action will be to check all calculations. If the calculations are correct, check the recovery of that analyte in the LCS. If the recovery of the analyte in the LCS is within limits, then matrix interference has been demonstrated and the laboratory operation may proceed. Analytical reports will show qualifier flags in such cases.

11.2 Instrument QC

Perform the following checks to verify instrument performance. Refer to Appendix B for acceptance criteria and required corrective action.

Instrument Check	Acronym	Frequency
Mass Calibration	MC	Annually and on as-needed basis
Mass Calibration Verification	MCV	After mass calibration
Initial Calibration	ICAL	Prior to analysis, and on as-needed basis
Initial Calibration Verification	ICV	Following each ICAL
Initial Blank	IBLK	Daily prior to analysis and after high standards
Qualitative Isomer Check	QIC	Daily prior to analysis
Bile Salts Check	BSC	Daily prior to DoD-complaint analysis
Instrument Sensitivity Check	ISC	Daily prior to analysis
Continuing Calibration Verification	CCV	After every 10 field samples
Continuing Calibration Blank	CCB	After each CCV
Retention Time Windows	RTW	After ICAL and at the beginning of analytical sequence.

11.2.1 Instrument Blank (IBLK)

One instrument blank (IBLK) is analyzed immediately following the highest ICAL standard analyzed, each analysis day prior to sample analysis, and following each bracketing CCV in a sequence, to check for carryover and instrument contamination. The concentration of each analyte must be ≤ 1/2 the LOQ. If the IBLK does not pass this requirement after the highest ICAL standard, the calibration must be performed using a lower concentration for the highest standard until the acceptance criteria is met. For daily IBLKs, if there are detections between the MDL and ½ LOQ, the IBLK is deemed acceptable, but the data will be appropriately qualified.

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11.2.2 Qualitative Isomer Check

A qualitative identification standard (Section 8.2) containing all available isomers (branched and linear) is analyzed once daily at the beginning of the analytical sequence, to confirm the retention time of each linear and known branched isomer or isomer group. All required branched isomer peaks must be present and visibly resolved from their corresponding linear peak.

11.3 Method Performance

Routine method performance is validated through analysis of matrix-specific reference samples, including spikes and PTs. Ongoing method performance is monitored through QC samples analyzed alongside samples. The parameters monitored include percent recovery of EIS compounds, blank concentrations, and native compound recoveries.

The specifications contained in this method can be met if the apparatus used is calibrated and maintained properly. The standards used for initial calibration (Section 8.2), calibration verification (Sections 9.2.4), and for initial (Section 11.4) and ongoing (Section 11.1.2) 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.

To assess method performance on the sample matrix, the laboratory must spike all samples with the EIS solution (Section 8.2) and all sample extracts with the NIS spiking solution (Section 8.2). Analyze each sample according to the procedures in this SOP. Compute the percent recovery of the EIS compound concentration using the NIS quantitation method and the equation in Section 11.1.2. The recovery of each EIS and NIS compound must be assessed and be within the control limits; the lab must maintain records of these assessments. If the recovery of any compound falls outside of these limits, method performance is unacceptable for that compound in that sample. If the recovery cannot be brought within the normal range, water samples are diluted, and smaller amounts of soils, biosolids, sediments, and other matrices are prepared and analyzed, per Section 9.4.2.

NIS areas must be greater than 30% of the average area of the calibration standards in undiluted sample extracts and extracts that required additional NIS to be added. NIS areas corrected for the dilution factor must be greater than 30% of the average area of the calibration standards in diluted samples when additional NIS was not added during dilution of the extract.

EIS Preliminary inhouse acceptance criteria of 20-150% must be used until inhouse limits are generated as described below; the inhouse lower acceptance limit cannot be <20% for any EIS compound.

After the analysis of 30 samples of a given matrix type (water, soil, biosolids, etc.) for which the isotopically labeled compounds pass the tests in this section, compute the R and the standard deviation of the percent recovery (SR) for the isotopically labeled compounds only. Express the assessment as a percent recovery interval from R - 2SR to R + 2SR for each matrix. For example, if R = 90% and SR = 10% for five analyses of soil, the recovery interval is expressed

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as 70 to 110%. Update the accuracy assessment for each isotopically labeled compound in each matrix on a regular basis (e.g., after each five to ten new measurements).

11.3.1 Method Validation

Refer to corporate SOP ENV-SOP-CORQ-0011 for general requirements and procedures for method validation.

Establish detection limits (DL) and limits of quantitation (LOQ) at initial method set up and verify the DL and LOQ on an on-going basis thereafter. Refer to corporate policy and/or SOP for DL and LOQ requirements and procedures.

11.4 Analyst Qualifications and Training

Employees that perform any step of this procedure must have a completed Read and Acknowledgment Statement for this version of the SOP in their training record. In addition, prior to unsupervised (independent) work on any client sample, analysts that prepare or analyze samples must have successful initial demonstration of capability (IDOC) and must successfully demonstrate on-going proficiency on an annual basis (see below for details). Successful means the initial and on-going DOC met criteria, documentation of the DOC is complete, and the DOC record is in the employee's training file.

IDOC - 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.

Extract, concentrate, and analyze four aliquots of the matrix type to be tested (Section 7.2), prepared in the same way as the mid-level LCS/OPR. At least one method blank, matching the matrix being analyzed, must be prepared with the IDOC batch. If more than one MB was prepared and analyzed with the IDOC batch, all blank results must be reported. All sample processing steps that are to be used for processing samples, including preparation and extraction, cleanup, and concentration (Sections 9.3.3 through 9.3.7), must be included in this test.

Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.

For each native and isotopically labeled compound, compare RSD and R with the corresponding limits for initial precision and recovery. If RSD and R for all compounds 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 R falls outside the range for recovery, system performance is unacceptable for that compound. Correct the problem and repeat the test.

12.0 Data Review & Corrective Action

12.1 Data Review

The data review process of Pace® Analytical Services includes a series of checks performed at different stages of the process by different people to ensure that SOPs were followed, the

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analytical record is complete, and properly documented, QC criteria were met, proper corrective actions were taken for QC failure and other nonconformance(s), and test results are reported with proper qualification, when necessary.

The review and checks that are performed by the employee performing the task is called primary review.

All data and test results are also peer reviewed.

This process, known as secondary review is performed to verify SOPs were followed, that calibration, instrument performance, and QC criteria were met and/or proper corrective actions were taken, qualitative ID and quantitative measurement is accurate, all manual integrations are justified and documented, and approved in accordance with the Pace® Analytical Services SOP for manual integration, calculations are correct, the analytical record is complete and traceable, and that results are properly qualified.

Lastly, a third-level review, called a completeness check, is performed by reporting or project management staff to verify the test report is complete.

Refer to *Data Review* SOP [QA SOP ENV-SOP-WCOL-0075] for specific instructions and requirements for each step of the data review process.

12.2 Corrective Action

Corrective action is required when QC or sample results are not within acceptance criteria.

Refer to Appendix B for a complete summary of QC, acceptance criteria, and recommended corrective actions for QC associated with this test method.

If corrective action is not taken or was not successful, the decision/outcome must be documented in the analytical record. The primary analyst has primary responsibility for taking corrective action when QA/QC criteria are not met. Secondary data reviewers must verify that appropriate action was taken and/or that results reported with QC failure are properly qualified.

Corrective action is also required when carryover is suspected and when results are over range.

Samples analyzed after a high concentration sample must be checked for carryover and reanalyzed if carryover is suspected. Carryover is usually indicated by low concentration detects of the analyte in successive samples analyzed after the high concentration sample.

Sample results at concentrations above the upper limit of quantitation must be diluted and reanalyzed. The result in the diluted samples should be within the upper half of the calibration range. Results less than the mid-range of the calibration indicate the sample was over diluted and analysis should be repeated with a lower level of dilution. If dilution is not performed, any result reported above the upper range is considered a qualitative measurement and must be qualified as an estimated value.

13.0 Pollution Prevention & Waste Management

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Pace® proactively seeks ways to minimize waste generated during work processes. Some examples of pollution prevention include but are not limited to reduced solvent extraction, solvent capture, use of reusable cycletainers for solvent management, and real-time purchasing.

The EPA requires that laboratory waste management practices comply with all applicable federal and state laws and regulations. Excess reagents, samples, and method process wastes are characterized and disposed of in an acceptable manner in accordance with the Pace® Chemical Hygiene Plan / Safety Manual. Refer to this manual for these procedures.

14.0 MODIFICATIONS

A modification is a change to a reference test method made by the laboratory. For example, changes in stoichiometry, technology, quantitation ions, reagent or solvent volumes, reducing digestion or extraction times, instrument runtimes, etc. are all examples of modifications. Refer to Pace ENV corporate SOP ENV-SOP-CORQ-0011 (Method Validation and Instrument Verification) for the conditions under which the procedures in test method SOPs may be modified and for the procedure and document requirements.

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 other changes are not allowed without prior review and approval.

Each time a modification is made to this method, the laboratory is required to repeat the procedure in Sections 11.3.1 and 11.4. If calibration will be affected by the change, the instrument must be recalibrated per Section 9.2. Once the modification is demonstrated to produce results 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 are met (e.g., isotopically labeled compound recovery).

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.

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.

d) Results from all quality control (QC) tests comparing the modified method to this method, including:

i. Calibration (ICAL)

ii. Calibration verification (CCV)

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iii. Initial Demonstration of Capability (IDOC)

iv. Isotopically labeled compound recovery (EIS/NIS)

v. Analysis of blanks (IBLK, MB)

vi. Accuracy assessment (Section 11.3)

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

vi. Extract volume prior to each cleanup step

vii. Extract volume after each cleanup step

viii. Final extract volume prior to injection

ix. Injection volume

x. Dilution data, differentiating between dilution of a sample or extract

xi. Instrument Identification

xii. Column (dimensions, liquid phase, solid support, film thickness, etc.)

xiii. Operating conditions (temperatures, temperature program, flow rates)

xiv. Detector (type, operating conditions, etc.)

xv. Chromatograms, printer tapes, and other recordings of raw data

xvi. Quantitation reports, data system outputs, and other data to link the raw data to the results reported

15.0 RESPONSIBILITIES

- All PAS employees that perform any part this procedure in their work activities must have a signed Read and Acknowledgement Statement (R&A) in their training file.
- PAS supervisors and managers are responsible for training employees on the procedures in this SOP, implementing the SOP in the work area, and monitoring on-going adherence to the SOP the work area(s) they oversee.

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- Local quality personnel are responsible for tracking the currency of the R&A on this SOP for employees at the locations they are assigned to and for notifying the department leaders of overdue assignments.
- All employees of PAS are responsible for following the procedures in this SOP. Unauthorized deviations or departures from this SOP are not allowed except with documented approval from the local Quality Manager and only when those deviations do not violate the Pace® Code of Ethics or Professional Conduct (COR-POL-0004) or associated policy and procedure(s). Hand-edits or manual change to the SOP are not permitted. If a change is desired or necessary, employees must follow the procedures for document revision specified in corporate SOPs ENV-SOP-CORQ-0015, *Document Management* and ENV-SOP-CORQ-0016, *SOP for Creation of SOP and SWI*.
- Local quality personnel are responsible for monitoring conformity to this SOP during routine internal audits of work areas that utilize this SOP and for communicating gaps and deviations found during monitoring to the work area supervisor, who is responsible for correction of the situation.

16.0 ATTACHMENTS

- Appendix A: Target Analyte Limits, Analytical Parameters, and Calibration
    - Table 1: Routine Analyte List Limits of Detection (LOD) and Limits of Quantitation (LOQ)[1]
    - Table 2: Identification and Quantification Information for Target Analytes, Extracted Internal Standards and Non-extracted Internal Standards
    - Table 3: Calibration Standard Concentrations (ng/mL)
- Appendix B: QC Summary
- Appendix C: Sample Pre-screening Instructions
- Appendix D: Aqueous Sample Subsampling Instructions
- Appendix E: MS/MSD, MS/FD sample Selection Protocols

17.0 REFERENCES

Note: Where reference exclude a date or edition, the latest edition of the referenced document adopted/recognized by the laboratory's accreditation bodies applies. Refer to the Laboratory Quality Manual [QAMP ENV-MAN-WCOL-0001] for details.

- ENV-SOP-CORQ-0006, *Manual Integration*, current version.
- ENV-SOP-CORQ-0011, *Method Validation*, current version.
- ENV-SOP-CORQ-0015, *Document Management*, current version.
- ENV-SOP-CORQ-0016, *SOP for SOP and SWI,* current version.
- ENV-TMP-CORQ-0007, *Quality Manual Template*, current version.
- COR-POL-0004, *Code of Ethics and Professional Conduct*, current version.

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- COR-MAN-001, *Pace® Safety Manua*l, current version.
- ENV-MAN-WCOL-0001, Quality Assurance Manual, current version.
- "Working with Carcinogens," Department of Health, Education, & Welfare, Public Health Service, Centers for Disease Control, NIOSH, Publication 77-206, August 1977, NTIS PB-277256.
- "OSHA Safety and Health Standards, General Industry," OSHA 2206, 29 CFR 1910.
- "Safety in Academic Chemistry Laboratories," ACS Committee on Chemical Safety, 1979.
- "Standard Methods for the Examination of Water and Wastewater," 18th edition and later revisions, American Public Health Association, 1015 15th St, NW, Washington, DC 20005, 1-35: Section 1090 (Safety), 1992.
- "Standard Practice for Sampling Water," ASTM Annual Book of Standards, ASTM, 1916 Race Street, Philadelphia, PA 19103-1187, 1980.
- "Handbook of Analytical Quality Control in Water and Wastewater Laboratories," USEPA EMSL, Cincinnati, OH 45268, EPA 600/4-79-019, April 1979.
- "Less is Better: Laboratory Chemical Management for Waste Reduction," American Chemical Society, 1993. Available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th Street NW, Washington, DC 20036.
- "Environmental Management Guide for Small Laboratories," USEPA, Small Business Division, Washington DC, EPA 233-B-00-001, May 2000.
- "The Waste Management Manual for Laboratory Personnel," American Chemical Society, 1990. Available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th Street NW, Washington, DC 20036.
- SERDP. Single-Laboratory Validation Study of PFAS by Isotope Dilution LC-MS/MS. ER19-1409. January 26, 2022.
- DoD QSM (US Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.4, 2021)
- Woudneh, Million B., Bharat Chandramouli, Coreen Hamilton, Richard Grace, 2019, "Effects of Sample Storage on the Quantitative Determination of 29 PFAS: Observation of Analyte Interconversions during Storage", Environmental Science and Technology 53(21): 12576-12585.
- EPA. Draft Method 1633, Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS. August 2021.
- Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017 – Total, Fixed, and Volatile Solids in Solid and Semisolid Samples, Method 2540.

18.0 REVISION HISTORY

Revisions Made from Prior Version

Section	Description of Change
8.2	Updated MeOH to Methanal[1] (Methanolic Ammonium Hydroxide (1%)

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8.2	Under Bile Salts Check standard removed note about only when analyzing tissue samples or following DoD QSM protocols.
9.2.3.1	Added information about if weighted or non-weighted regression is being used.
9.3.3	Added requirement for documenting manifold ID and position for QC samples and field samples per Wisconsin audit.
10.1.1	Added "S/N ratio must be 10:1 if no confirmation ion is sued for the analyte per Wisconsin audit finding. As well as the requirement for 10 scans acquired across the peak.
11.1.1	Add Wisconsin specific requirement for method blanks
11.2.1	Added detection acceptance criteria.

Document Succession: This version replaces the following document(s):

Document Number	Version	Document Title	Effective Date:
ENV-SOP-WCOL-0158	03	PFAS by Method 1633	03/13/2023

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Appendix A: Target Analyte Limits, Analytical Parameters, and Calibration

Table 1: Routine Analyte List Limits of Detection (LOD) and Limits of Quantitation (LOQ)[1]

Analyte	Aqueous (ng/L)		Leachate (ng/L)		Solid (ng/g)		Biosolid (ng/g)		AFFF by App. D (µg/L)	
	LOD	LOQ	LOD	LOQ	LOD	LOQ	LOD	LOQ	LOD	LOQ
PFBA	1.6	4	8	20	0.32	0.8	3.2	8	40	100
PFPeA	0.4	2	2	10	0.16	0.4	1.6	4	10	50
PFHxA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
PFHpA	0.8	1	4	5	0.08	0.2	0.8	2	20	25
PFOA	0.8	1	4	5	0.08	0.2	0.8	2	20	25
PFNA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
PFDA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
PFUnA	0.8	1	4	5	0.08	0.2	0.8	2	20	25
PFDoA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
PFTrDA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
PFTeDA	0.8	1	4	5	0.08	0.2	0.8	2	20	25
PFBS	0.355	1	1.775	5	0.071	0.2	0.710	2	8.88	25
PFPeS	0.753	1	3.765	5	0.075	0.2	0.753	2	18.8	25
PFHxS	0.731	1	3.655	5	0.073	0.2	0.731	2	18.3	25
PFHpS	0.381	1	1.905	5	0.076	0.2	0.762	2	9.53	25
PFOS	0.742	1	3.71	5	0.074	0.2	0.742	2	18.6	25
PFNS	0.385	1	1.925	5	0.077	0.2	0.770	2	9.63	25
PFDS	0.386	1	1.93	5	0.077	0.2	0.772	2	9.65	25
PFDoS	0.388	1	1.94	5	0.078	0.2	0.776	2	9.7	25
4:2 FTS	1.5	4	7.5	20	0.3	0.8	3	8	37.5	100
6:2 FTS	4.56	5	22.8	25	0.608	0.8	6.08	8	114	125
8:2 FTS	1.536	4	7.68	20	0.307	0.8	3.072	8	38.4	100
PFOSA	0.4	1	2	5	0.04	0.2	0.4	2	10	25
NMeFOSA	0.8	1	4	5	0.04	0.2	0.4	2	20	25
NEtFOSA	0.4	1	2	5	0.08	0.2	0.8	2	10	25
NMeFOSAA	0.8	1	4	5	0.08	0.2	0.8	2	20	25
NEtFOSAA	0.8	1	4	5	0.16	0.2	1.6	2	20	25
NMeFOSE	2	10	10	50	0.8	2.0	8	20	50	250
NEtFOSE	2	10	10	50	0.8	2.0	8	20	50	250
HFPO-DA	2.4	4	12	20	0.8	1.0	8	10	60	100
ADONA	2.268	4	11.34	20	0.756	0.8	7.56	8	56.7	100
PFEESA	1.139	2	5.695	10	0.285	0.4	2.848	4	28.5	50
PFMPA	0.64	2	3.2	10	0.32	0.4	3.2	4	16	50
PFMBA	1.28	2	6.4	10	0.32	0.4	3.2	4	32	50
NFDHA	1.28	2	6.4	10	0.8	1.0	8	10	32	50
9Cl-PF3ONS	2.244	4	11.22	20	0.748	1.0	7.48	10	56.1	100
11Cl-PF3OUdS	2.268	4	11.34	20	0.756	0.8	7.56	8	56.7	100
3:3 FTCA	2	5	10	25	0.8	1.0	8	10	50	125
5:3 FTCA	10	25	50	125	4.0	5.0	40	50	250	625
7:3 FTCA	10	25	50	125	4.0	5.0	40	50	250	625

[1] *Values as of effective date of this SOP. LOQ are subject to change, contact quality personnel for most current information.*

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Table 2: Identification and Quantification Information for Target Analytes, Extracted Internal Standards and Non-extracted Internal Standards

Compound Name	CAS Number	Compound Abbreviation	Parent Ion Mass	Quantification Ion Mass	Confirmation Ion Mass	Quantification Reference Compound
Perfluorobutanoic acid	375-22-4	PFBA	213	169	NA	13C4-PFBA
Perfluoropentanoic acid	2706-90-3	PFPeA	263	218.9	69	13C5-PFPeA
Perfluorohexanoic acid	307-24-4	PFHxA	313	268.9	118.9	13C5-PFHxA
Perfluoroheptanoic acid	375-85-9	PFHpA	362.9	319	169	13C4-PFHpA
Perfluorooctanoic acid	335-67-1	PFOA	413	369	169	13C8-PFOA
Perfluorononanoic acid	375-95-1	PFNA	463	419	219	13C9-PFNA
Perfluorodecanoic acid	335-76-2	PFDA	513	469	219	13C6-PFDA
Perfluoroundecanoic acid	2058-94-8	PFUnA	563	518.9	269.1	13C7-PFUnA
Perfluorododecanoic acid	307-55-1	PFDoA	613	569	319	13C2-PFDoA
Perfluorotridecanoic acid	72629-94-8	PFTrDA	663.0	618.9	168.9	13C2-PFDoA
Perfluorotetradecanoic acid	376-06-7	PFTeDA	713	668.9	168.9	13C2-PFTeDA
Perfluorobutanesulfonic acid	375-73-5	PFBS	298.9	80	98.8	13C3-PFBS
Perfluoropentansulfonic acid	2706-91-4	PFPeS	349	80	98.9	13C3-PFHxS
Perfluorohexanesulfonic acid	355-46-4	PFHxS	398.9	80	99	13C3-PFHxS
Perfluoroheptanesulfonic acid	375-92-8	PFHpS	449	80	98.8	13C8-PFOS
Perfluorooctanesulfonic acid	1763-23-1	PFOS	499	80	99	13C8-PFOS
Perfluorononanesulfonic acid	68259-12-1	PFNS	549	80	98.8	13C8-PFOS
Perfluorodecanesulfonic acid	335-77-3	PFDS	599	80	98.8	13C8-PFOS
Perfluorododecanesulfonic acid	79780-39-5	PFDoS	698.9	80	99	13C8-PFOS
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	757124-72-4	4:2FTS	327	306.9	80.9	13C2-4:2FTS
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	27619-97-2	6:2FTS	427	406.9	80.9	13C2-6:2FTS
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	39108-34-4	8:2FTS	527	506.9	81	13C2-8:2FTS
Perfluorooctanesulfonamide	754-91-6	PFOSA	497.9	78	478	13C8-PFOSA
N-methyl perfluorooctanesulfonamide	31506-32-8	NMeFOSA	512	219	169	D3-NMeFOSA
N-ethyl perfluorooctanesulfonamide	4151-50-2	NEtFOSA	526	219	169	D5-NEtFOSA
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	NMeFOSAA	570	418.9	483	D3-NMeFOSAA
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	NEtFOSAA	584	418.9	526	D5-NEtFOSAA
N-methyl perfluorooctanesulfonamidoethanol	24448-09-7	NMeFOSE	616	59.1	NA	D7-NMeFOSE

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Compound Name	CAS Number	Compound Abbreviation	Parent Ion Mass	Quantification Ion Mass	Confirmation Ion Mass	Quantification Reference Compound
N-ethyl perfluorooctanesulfonamidoethanol	1691-99-2	NEtFOSE	630	59.1	NA	D9-NEtFOSE
Hexafluoropropylene oxide dimer acid (GenX)	13252-13-6	HFPO-DA	285	169	184.9	13C3-HFPODA
4,8-Dioxa-3H-perfluorononanoic acid	919005-14-4	ADONA	377	251	85.1	13C3-HFPODA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	756426-58-1	9Cl-PF3ONS	530.9	350.9	533→353	13C3-HFPODA
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9	11Cl-PF3OUdS	630.9	450.9	633→453	13C3-HFPODA
3-Perfluoropropyl propanoic acid (FPrPA)	356-02-5	3:3FTCA	241	177	117	13C5-PFPeA
2H,2H,3H,3H-Perfluorooctanoic acid (FPePA)	914637-49-3	5:3FTCA	341	237.1	217	13C5-PFHxA
3-Perfluoroheptyl propanoic acid (FHpPA)	812-70-4	7:3FTCA	441	317	337	13C5-PFHxA
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	PFEESA	315	135	83	13C5-PFHxA
Perfluoro-3-methoxypropanoic acid	377-73-1	PFMPA	229	85	NA	13C5-PFPeA
Perfluoro-4-methoxybutanoic acid	863090-89-5	PFMBA	279	85	NA	13C5-PFPeA
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NFDHA	295	201	85	13C5-PFHxA
Extracted Internal Standard (EIS) Compounds						
Perfluoro-n-[13C4] butanoic acid	N/A	13C4-PFBA	217	172	NA	13C3-PFBA
Perfluoro-n-[13C5] pentanoic acid	N/A	13C5-PFPeA	268	223	NA	13C2-PFHxA
Perfluoro-n-[1,2,3,4,6-13C5] hexanoic acid	N/A	13C5-PFHxA	318	273	NA	13C2-PFHxA
Perfluoro-n-[1,2,3,4-13C4] heptanoic acid	N/A	13C4-PFHpA	366.9	322	NA	13C2-PFHxA
Perfluoro-n-[13C8] octanoic acid	N/A	13C8-PFOA	421	376	NA	13C4-PFOA
Perfluoro-n-[13C9] nonanoic acid	N/A	13C9-PFNA	472	427	NA	13C5-PFNA
Perfluoro-n-[1,2,3,4,5,6-13C6] decanoic acid	N/A	13C6-PFDA	519	474	NA	13C2-PFDA
Perfluoro-n-[1,2,3,4,5,6,7-13C7] undecanoic acid	N/A	13C7-PFUnA	570	525	NA	13C2-PFDA
Perfluoro-n-[1,2-13C2] dodecanoic acid	N/A	13C2-PFDoA	615	570	NA	13C2-PFDA
Perfluoro-n-[13C2] tetradecanoic acid	N/A	13C2-PFTeDA	715	669.9	NA	13C2-PFDA
Perfluoro-1-[13C3] butanesulfonic acid	N/A	13C3-PFBS	301.9	80	NA	18O2-PFHxS
Perfluoro-1-[1,2,3-13C3] hexanesulfonic acid	N/A	13C3-PFHxS	402	80	NA	18O2-PFHxS
Perfluoro-1-[13C8] octanesulfonic acid	N/A	13C8-PFOS	507	79.9	NA	13C4-PFOS

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Compound Name	CAS Number	Compound Abbreviation	Parent Ion Mass	Quantification Ion Mass	Confirmation Ion Mass	Quantification Reference Compound
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] hexanesulfonic acid	N/A	13C2-4:2FTS	329	81	NA	18O2-PFHxS
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] octanesulfonic acid	N/A	13C2-6:2FTS	429	81	NA	18O2-PFHxS
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] decanesulfonic acid	N/A	13C2-8:2FTS	529	81	NA	18O2-PFHxS
Perfluoro-1-[13C8] octanesulfonamide	N/A	13C8-PFOSA	505.9	78	NA	13C4-PFOS
N-methyl-d3-perfluoro-1-octanesulfonamide	N/A	D3-NMeFOSA	515	219	NA	13C4-PFOS
N-ethyl-d5-perfluoro-1-octanesulfonamide	N/A	D5-NEtFOSA	531	219	NA	13C4-PFOS
N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid	N/A	D3-NMeFOSAA	573	419	NA	13C4-PFOS
N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid	N/A	D5-NEtFOSAA	589	418.9	NA	13C4-PFOS
N-methyl-d7-perfluorooctanesulfonamidoethanol	N/A	D7-NMeFOSE	623	59	NA	13C4-PFOS
N-ethyl-d9 -perfluorooctanesulfonamidoethanol	N/A	D9-NEtFOSE	639	59	NA	13C4-PFOS
Tetrafluoro-2-heptafluoropropoxy-13C3 -propanoic acid	N/A	13C3-HFPO-DA	287	169	NA	13C2-PFHxA
Non-Extracted Internal Standard (NIS) Compounds						
Perfluoro-n-[2,3,4-13C3] butanoic acid	N/A	13C3-PFBA	216	172	NA	NA
Perfluoro-n-[1,2-13C2] hexanoic acid	N/A	13C2-PFHxA	315	270	NA	NA
Perfluoro-n-[1,2,3,4-13C4] octanoic acid	N/A	13C4-PFOA	417	172	NA	NA
Perfluoro-n-[1,2,3,4,5-13C5] nonanoic acid	N/A	13C5-PFNA	468	423	NA	NA
Perfluoro-n-[1,2-13C2] decanoic acid	N/A	13C2-PFDA	515	470	NA	NA
Perfluoro-1-hexane[18O2] sulfonic acid	N/A	18O2-PFHxS	403	84	NA	NA
Perfluoro-n-[1,2,3,4-13C4] octanesulfonic acid	N/A	13C4-PFOS	503	80	NA	NA

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Table 3: Calibration Standard Concentration (ng/mL)

Compound	L1 (ISC)	L2	L3	L4	L5 (CCV)[1]	L6	L7	L8	L9	L10
Perfluoroalkyl carboxylic acids										
PFBA	0.4	0.8	2	5	10	20	50	100	200	250
PFPeA	0.2	0.4	1	2.5	5	10	25	50	100	125
PFHxA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFHpA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFOA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFNA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFDA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFUnA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFDoA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFTrDA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
PFTeDA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
Perfluoroalkyl sulfonic acids										
PFBS	0.0887	0.1774	0.4435	1.109	2.218	4.435	11.088	22.175	44.35	55.438
PFPeS	0.0941	0.1882	0.4705	1.176	2.353	4.705	11.763	23.525	47.050	58.813
PFHxS	0.0914	0.1828	0.457	1.143	2.285	4.57	11.425	22.850	45.7	57.125
PFHpS	0.0953	0.1906	0.4765	1.191	2.383	4.765	11.913	23.825	47.65	59.563
PFOS	0.0928	0.1856	0.464	1.16	2.32	4.64	11.6	23.2	46.4	58.0
PFNS	0.0962	0.1924	0.481	1.203	2.405	4.81	12.025	24.050	48.1	60.125
PFDS	0.0965	0.193	0.4825	1.206	2.413	4.825	12.063	24.125	48.25	60.313
PFDoS	0.097	0.194	0.485	1.213	2.425	4.85	12.125	24.25	48.5	60.625
Fluorotelomer sulfonic acids										
4:2FTS	0.375	0.75	1.875	4.688	9.375	18.75	46.875	93.75	187.5	NA
6:2FTS	0.38	0.76	1.9	4.75	9.5	19	47.5	95	190	NA
8:2FTS	0.384	0.768	1.92	4.8	9.6	19.2	48	96	192	NA
Perfluorooctane sulfonamides										
PFOSA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
NMeFOSA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
NEtFOSA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
Perfluorooctane sulfonamidoacetic acids										
NMeFOSAA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
NEtFOSAA	0.1	0.2	0.5	1.25	2.5	5	12.5	25	50	62.5
Perfluorooctane sulfonamide ethanols										
NMeFOSE	1	2	5	12.5	25	50	125	250	500	625
NEtFOSE	1	2	5	12.5	25	50	125	250	500	625
Per- and polyfluoroether carboxylic acids										
HFPO-DA	0.4	0.8	2	5	10	20	50	100	200	250

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Compound	L1 (ISC)	L2	L3	L4	L5 (CCV)[1]	L6	L7	L8	L9	L10
ADONA	0.378	0.756	1.89	4.725	9.45	18.9	47.25	94.5	189	236.25
PFMPA	0.2	0.4	1	2.5	5	10	25	50	100	125
PFMBA	0.2	0.4	1	2.5	5	10	25	50	100	125
NFDHA	0.2	0.4	1	2.5	5	10	25	50	100	125
Ether sulfonic acids										
9Cl-PF3ONS	0.374	0.748	1.87	4.675	9.35	18.7	46.75	93.5	187	233.75
11Cl-PF3OUdS	0.378	0.756	1.89	4.725	9.45	18.9	47.25	94.5	189	236.25
PFEESA	0.178	0.356	0.89	2.225	4.45	8.9	22.25	44.5	89	111.25
Fluorotelomer Carboxylic Acids										
3:3FTCA	0.5	1	2.5	6.25	12.5	25	62.5	125	250	312.5
5:3FTCA	2.5	5	12.5	31.25	62.5	125	312.5	625	1250	1560
7:3FTCA	2.5	5	12.5	31.25	62.5	125	312.5	625	1250	1560
Extracted Internal Standard (EIS) Compounds										
13C4-PFBA	10	10	10	10	10	10	10	10	10	10
13C5-PFPeA	5	5	5	5	5	5	5	5	5	5
13C5-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C8-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C9-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C6-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C7-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C3-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C3-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C8-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C2-4:2FTS	5	5	5	5	5	5	5	5	5	5
13C2-6:2FTS	5	5	5	5	5	5	5	5	5	5
13C2-8:2FTS	5	5	5	5	5	5	5	5	5	5
13C8-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D3-NMeFOSAA	5	5	5	5	5	5	5	5	5	5
D5-NEtFOSAA	5	5	5	5	5	5	5	5	5	5
D7-NMeFOSE	25	25	25	25	25	25	25	25	25	25
D9-NEtFOSE	25	25	25	25	25	25	25	25	25	25
13C3-HFPODA	10	10	10	10	10	10	10	10	10	10
Non-Extracted Internal Standard (NIS) Compounds										

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Compound	L1 (ISC)	L2	L3	L4	L5 (CCV)[1]	L6	L7	L8	L9	L10
13C3-PFBA	5	5	5	5	5	5	5	5	5	5
13C2-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C5-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
18O2-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

[1] *This calibration point is used as the calibration verification (CCV)*

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Appendix B: QC Summary and Corrective Action Table

QC Item	Frequency	Acceptance Criteria	Corrective Action	Qualification
Mass Calibration	Annually and on as-needed basis.	Must meet manufacturer's acceptance criteria.	Identify and correct source of problem, repeat.	None. Do not proceed with analysis.
Mass Calibration Verification	After each Mass Calibration performed.	Must meet manufacturer's acceptance criteria.	Identify and correct source of problem, repeat Mass Calibration.	None. Do not proceed with analysis.
ICAL	At instrument set up, after CCV failure and/or major maintenance.	Must meet one of the curve fit options presented in Section 9.2.3.	Identify and correct source of problem, repeat.	None. Do not proceed with analysis.
ICV	After Each ICAL.	All analytes must be within ± 30% of their true values. (%R)	Identify and correct source of problem, re-analyze. If repeat failure, repeat ICAL. Analysis may proceed if it can be demonstrated that the ICV exceedance has no impact on analytical measurements. For example, the ICV %R is high, CCV is within criteria, and the analyte is not detected in sample(s).	Qualify analytes with ICV out of criteria.
RT Window Position	Once per ICAL and at the beginning of the analytical window.	Position is set using the mid-point of the ICAL on the day ICAL is performed; otherwise, mid-level CCV is used.	NA	NA
RT Window Study	At method set-up and after major instrument maintenance	RT Window is ± 60 secs from RT position.	NA	NA

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QC Item	Frequency	Acceptance Criteria	Corrective Action	Qualification
ISC	Daily before sample analysis.	All native compounds within ± 30% recovery.	See Section 9.2.4 for corrective actions based on circumstance. If problem persists, repeat ICAL.	No samples shall be analyzed until ISC has met acceptance criteria.
Qualitative Isomer Check	Once per ICAL and daily before sample analysis.	All required branched isomer peaks present and visibly resolved from linear peaks.	Identify and correct source of problem and reanalyze Isomer Check.	No samples shall be analyzed until Isomer Check has met acceptance criteria.
Bile Salts Check	Once per ICAL and daily before sample analysis.	Bile Salt peak detected >1 min outside RT window for PFOS.	Identify and correct source of problem and reanalyze Bile Salts Check.	No samples shall be analyzed until Bile Salts Check has met acceptance criteria.
CCV	Daily before sample analysis (ISC), after every 10 samples, and at end of analytical sequence.	All native and isotopically labelled compounds within ± 30% recovery.	See Section 9.2.4 for corrective actions based on circumstance. If problem persists, repeat ICAL.	Qualify analytes with CCV out of criteria.
Instrument Blank (IBLK) / CCB	Daily prior to analysis and after high standards, including CCV.	Must meet criteria specified in Section 11.2.1: all detections ≤1/2 LOQ.	Identify and correct source of contamination or performance issue. Reanalyze IBLK.	No samples shall be analyzed until IBLK has met acceptance criteria.
Extracted Internal Standards (EIS)	Every field sample, standard and QC sample.	Must meet criteria specified in Section 11.3. Preliminary acceptance range: 20-150% REC (based on calculated concentration).	If batch QC is acceptable, reanalyze to confirm. If confirmed, reprepare and reanalyze samples. If reprep is within acceptance, report reprep data. If failure is confirmed by reprep, qualify as matrix impacted.	Qualify outages and explain in case narrative.

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QC Item	Frequency	Acceptance Criteria	Corrective Action	Qualification
Non-extracted Internal Standards (NIS)	Every field sample, standard and QC sample.	Must meet criteria specified in Section 11.3. Preliminary acceptance criteria: >30% REC (based on response).	Troubleshoot instrument performance. Reanalyze samples.	Qualify outages and explain in case narrative.
Method Blank (MB)	1 per batch of 20 or fewer samples.	Must meet criteria specified in Section 11.1.1.	If IBLK is acceptable, reanalyze MB to confirm. If confirmed, reprepare and reanalyze associated impacted samples (if sufficient sample remains). If insufficient sample remains for reprep, narrate and report data associated to unacceptable MB.	Qualify outages and explain in case narrative.
LCS/LLLCS	1 pair per batch of 20 or fewer samples.	DoD: 40-150% until in-house limits generated; must meet criteria specified in Section 11.1.2.	If most recent ISC/CCV is acceptable, reanalyze LCS to confirm. If low-failure results are confirmed, reprepare and reanalyze associated samples (if sufficient sample remains). If insufficient sample remains for reprep, narrate and report data associated to low-failure LCS. If high-failure results are confirmed and sample(s) is ND for failing compound, narrate and report sample data.	Qualify outages and explain in case narrative.
MS/MSD	1 pair per batch of 20 or fewer samples.	DoD: RSD <30% between MS/MSD	If possible, reprep to confirm.	Qualify outages and explain in case narrative.
Sample Duplicate	1 per AFFF sample.	DoD: RSD <30% between parent/DUP	If possible, reprep to confirm.	Qualify outages and explain in case narrative.

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Appendix C: 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.

Aqueous Samples

1. Weight out 10 (±0.1) g of sample into a 50-mL centrifuge tube.

2. Add 100 µL of EIS 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 Samples

1. Weigh 1.0 (±0.1) g sample into 50-mL polypropylene centrifuge tubes.

2. Add 10 mL of 0.3% methanolic ammonium hydroxide to the sample. 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 filter vial:

   a. Add ~400 µL of clear extract from step 2 (e.g., by adding extract until it reaches the fill line).

   b. Use filter/plunger part and filter.

4. Transfer 200 µL of filtrate to a 1 mL polypropylene autosampler vial and dilute with 10uL of EIS and 790 µL of 0.3% methanolic ammonium hydroxide to a final volume of 1 mL. The extract is now approximately 50X dilute, relative to a solid sample prepared by the protocols in Section 9. Sample is ready for instrumental analysis.

Calculate results using the equivalent sample weight computed as follows:

$$Equivalent\ Weight = Sample\ weight\ (g) x\ \frac{0.2\ mL}{10\ mL}$$

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Appendix D: Aqueous Sample Subsampling Instructions

Note: 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.

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.

AFFF and FFF (F3) Concentrates

Samples composed of AFFF or F3 concentrate will be subsampled consistently, with approximately **0.02g of concentrate** aliquoted for each discrete sample preparation/analysis; each AFFF or F3 concentrate sample **must be prepared in duplicate**. After creating and documenting the subsample aliquot, add approximately 60 mL of reagent water, cap the vessel, and shake vigorously by hand for 20-30 seconds. After adding the reagent water and agitating, allow **at least 3 hours** for the subsample aliquot to fully dissolve in the water. If dissolution is incomplete after 3 hours, agitate again and wait another 3 hours; consider applying continuous agitation (orbital shaker) if full dissolution of the aliquot into water requires extended time. Following the extended dissolution time, prepared AFFF/F3 samples should be prepared and analyzed following the routine protocols for aqueous sample processing. Aqueous reporting limits (MDL/LOD/LOQ) will be used, with values adjusted to account for the actual sample aliquot, assuming 1 g/mL; this constitutes a 25000X adjustment factor for AFFF/F3 reporting limits, relative to nominal aqueous reporting limits.

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APPENDIX E: MS/MSD, MS/FD SAMPLE SELECTION PROTOCOL

Background: DOD QSM 5.4, Table B-24 requires that a matrix spike (MS) sample and a matrix spike duplicate (MSD) be prepped with every prep batch. Therefore, all aqueous prep batches must include an MS/MSD pair, if possible. Prep analysts will select samples to be used for this purpose following a hierarchy of preference, as defined below:

Note: Any kind of blank (FB, TB, EB, RB, etc.) or samples designated as "DUP" by the client will not be used for MS/MSD analysis.

1. First preference is to use client-designated samples as MS/MSD samples. This designation should show up on the prep list, under comments. It is possible that SR will miss adding this comment to the sample, but this designation will be present in the COC from the client, on the right side of the COC under "Remarks/Cooler ID." When a client designates a sample to be used for MS/MSD analysis, they will typically provide us with more than 2 bottles (often 4, sometimes as many as 6).

2. Lacking a client-designated MS/MSD sample, the next preference is to use any sample received with more than 2 bottles provided. If an analyst selects a set of samples for prep in which none of the samples are client-designated for MS/MSD, the analyst should check for any samples in the set that were received with 3 or more bottles. If there is a sample with 3 or more bottles, pull 3 of them and use one for the parent sample and spike the other two for analysis as MS/MSD samples.

3. If all samples in a particular prep batch were all received in just one bottle, analysis of an MS/MSD pair will not be possible. This should be an uncommon occurrence, as prep analysts will attempt to adjust batching to ensure that every prep batch contains an MS/MSD. In lieu of an MS/MSD pair, a mid-spiked LCSD may be prepared.

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APPENDIX F: AQUEOUS SAMPLE CENTRIFUGATION PROTOCOL

Background: Draft 3 of Draft Method 1633 states “Laboratories may develop other strategies for minimizing the disruptions due to SPE clogging and slow extractions,” and “a trained analyst should be able to distinguish samples with very low TSS and focus…on only those samples that might present a risk of clogging.” Therefore, whether an individual sample will require centrifugation for proper preparation will be determined and documented by the preparation analyst. Furthermore, the method states “If centrifugation is used to prevent samples with high TSS from clogging the SPE, the EISs must be spiked into the original sample container prior to centrifugation.” This protocol complies with that dictate.

Procedure:

1. Inspect the sample and consider the necessity of centrifuging. Consider any visible indications of particulate matter including settled solids collected on the bottom of the container, cloudiness and/or dark color of the sample, suspended solids within the sample, increased viscosity, etc. If uncertain, seek a second opinion from another analyst, supervisor, or operations director.

2. If, in the judgement of the preparation analyst, a sample requires centrifugation, contemporaneously make a note on the prep batch log indicating this fact.

3. Spike samples requiring centrifugation in the same manner and with the same standard volume as samples which will not be centrifuged.

4. Label a 500mL conical centrifuge bottle with the sample ID for each sample that will be centrifuged. Set them in an appropriate rack with the caps removed.

5. Vigorously shake the spiked sample and then quickly pour it into the labeled centrifuge bottle. Try to ensure that the original sample bottle is devoid of any solid material. Be careful to avoid spilling sample during the transfer process. Tightly cap each centrifuge bottle after transfers are complete.

6. Transfer capped centrifuge bottles to centrifuge, ensuring that the centrifuge carousel is symmetrically balanced. Close top and centrifuge at 3000 RPM for 6 minutes.

7. Remove centrifuge bottles and decant the centrifuged liquid off of the condensed solids, back into the original sample bottle. Try to avoid transferring any of the condensed solids from the centrifuge bottle back to the original sample bottle, while maximizing the amount of liquid decanted off of the solid portion.

8. Weigh the full, decanted original sample bottle and document in the LIMS prep batch.

9. Extract the decanted sample as normal alongside un-centrifuged samples, up to the bottle rinse and elution steps.

10. When the SPE cartridges have been dried, rinse the original sample bottle following the protocol in Section 9.3.6. Additionally, add 4mL of 1% methanolic ammonium hydroxide (1%-

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MeOH) to each centrifuge bottle to rinse the inside of the centrifuge bottles and the remaining solids, as well as the cap. If the condensed solids become re-suspended while rinsing the centrifuge bottles, re-centrifugation may be required. Using a transfer pipet or mechanical pipet, transfer the 1%-MeOH rinse from the centrifuge bottle into the SPE cartridge and elute with the original sample bottle rinse into a 15mL conical centrifuge tube.

11. Add an additional volume of MeOH to the elution of all batch QC samples (MB/LCS/LCSD) to match the volume used for elution for any centrifuged sample in the prep batch. Typically, this will mean that 4mL of clean MeOH will be added directly to the SPE reservoir and eluted with the normal bottle rinses.

12. After elution, all sample extracts (client and QC) with additional elution volume shall be concentrated to ~4.5mL and brought to a final volume of ~5 mL with 1%-MeOH. Use a reference elution tube to reconstitute to the appropriate volume, similarly to the protocol in Section 9.3.4 of this SOP. This extract concentration and reconstitution should be done BEFORE adding acetic acid and dispersive carbon for cleanup; batch QC and client samples with additional container rinse volume should be processed through the same dGCB cleanup steps, following the protocols in Section 9.3.6.

13. Determine initial sample volume using the weights measured in step 8 of this appendix and the protocol in Section 9.3.6 of this SOP.

14. Generate a Non-Conformance Memo (NCM) noting which samples in the prep batch included centrifugation in the extraction process and any additional observations and/or deficiencies that were noted during the centrifugation process.

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Appendix B (of the QAPP) Pace Analytical ELAP Certification

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CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. TOD KOPYSCINSKI *NY Lab Id No: 10899*
PACE ANALYTICAL SERVICES, LLC - EAST LONGMEADOW, MA
39 SPRUCE STREET
EAST LONGMEADOW, MA 01028

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

Fuel Additives

Methyl tert-butyl ether	EPA 524.2
Naphthalene	EPA 524.2

Microextractables

1,2-Dibromo-3-chloropropane, Low Le	EPA 504.1
1,2-Dibromoethane, Low Level	EPA 504.1

Miscellaneous

Odor	SM 21-23 2150 B (-97)
Organic Carbon, Dissolved	SM 21-23 5310B (-00)
Organic Carbon, Total	SM 21-23 5310B (-00)
Turbidity	EPA 180.1 Rev. 2.0

Non-Metals

Alkalinity	SM 21-23 2320B (-97)
Chloride	SM 21-23 4500-Cl- B (-97)
	EPA 300.0 Rev. 2.1
Color	SM 21-23 2120B (-01)
Cyanide	SM 20, 21-23 4500-CN E
Fluoride, Total	EPA 300.0 Rev. 2.1
	SM 21-23 4500-F C (-97)
Nitrate (as N)	NECi Nitrate-Reductase
Nitrite (as N)	NECi Nitrate-Reductase
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
Solids, Total Dissolved	SM 21-23 2540C (-97)
Sulfate (as SO4)	ASTM D516-07, 11, 16
	EPA 300.0 Rev. 2.1

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 533

Serial No.: 70311

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Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 537.1, Version 2
4:2FTS	EPA 533
6:2FTS	EPA 533
8:2FTS	EPA 533
9Cl-PF3ONS	EPA 533
	EPA 537.1, Version 2
ADONA	EPA 533
	EPA 537.1, Version 2
HFPO-DA (GenX)	EPA 533
	EPA 537.1, Version 2
NEtFOSAA	EPA 537.1, Version 2
NFDHA	EPA 533
NMeFOSAA	EPA 537.1, Version 2
Perflourotridecanoic Acid (PFTrDA)	EPA 537.1, Version 2
Perfluordecanoic Acid (PFDA)	EPA 533
	EPA 537.1, Version 2
Perfluoro-3-Methoxypropanoic Acid (F	EPA 533
Perfluoro-4-Methoxybutanoic Acid (PF	EPA 533
Perfluorobutanesulfonic Acid (PFBS)	EPA 533
	EPA 537.1, Version 2
Perfluorobutanoic Acid (PFBA)	EPA 533
Perfluorododecanoic Acid (PFDoA)	EPA 533
	EPA 537.1, Version 2
Perfluoroheptanesulfonic Acid (PFHpS	EPA 533
Perfluoroheptanoic Acid (PFHpA)	EPA 533
	EPA 537.1, Version 2
Perfluorohexanesulfonic Acid (PFHxS	EPA 533

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Perfluorinated Alkyl Acids

Perfluorohexanesulfonic Acid (PFHxS	EPA 537.1, Version 2
Perfluorohexanoic Acid (PFHxA)	EPA 533
	EPA 537.1, Version 2
Perfluorononanoic Acid (PFNA)	EPA 533
	EPA 537.1, Version 2
Perfluorooctanesulfonic Acid (PFOS)	EPA 533
	EPA 537.1, Version 2
Perfluorooctanoic Acid (PFOA)	EPA 533
	EPA 537.1, Version 2
Perfluoropentanesulfonic Acid (PFPeS	EPA 533
Perfluoropentanoic Acid (PFPeA)	EPA 533
Perfluorotetradecanoic Acid (PFTeDA)	EPA 537.1, Version 2
Perfluoroundecanoic Acid (PFUnA)	EPA 533
	EPA 537.1, Version 2
PFEESA	EPA 533

Trihalomethanes

Bromodichloromethane	EPA 524.2
Bromoform	EPA 524.2
Chloroform	EPA 524.2
Dibromochloromethane	EPA 524.2
Total Trihalomethanes	EPA 524.2

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2

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Volatile Aromatics

1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2
n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
p-Isopropyltoluene (P-Cymene)	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2
Total Xylenes	EPA 524.2

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2

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Volatile Halocarbons

1,2,3-Trichloropropane	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 524.2
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2

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All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 624.1
Acrylonitrile	EPA 8260D
	EPA 624.1
Amines	
1,2-Diphenylhydrazine	EPA 625.1
	EPA 8270E
2-Nitroaniline	EPA 8270E
3-Nitroaniline	EPA 8270E
4-Chloroaniline	EPA 8270E
4-Nitroaniline	EPA 8270E
Aniline	EPA 625.1
	EPA 8270E
Pyridine	EPA 625.1
	EPA 8270E
Benzidines	
3,3'-Dichlorobenzidine	EPA 625.1
	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

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Chlorinated Hydrocarbon Pesticides

Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
beta-BHC	EPA 8081B
	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3
delta-BHC	EPA 8081B
	EPA 608.3
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
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Lindane	EPA 8081B

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Chlorinated Hydrocarbon Pesticides

Lindane	EPA 608.3
Methoxychlor	EPA 8081B
	EPA 608.3
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 625.1
	EPA 8270E

Demand

Biochemical Oxygen Demand	SM 5210B-2016
Carbonaceous BOD	SM 5210B-2016
Chemical Oxygen Demand	EPA 410.4, Rev. 2.0 (1993)

Dissolved Gases

Ethane	RSK-175

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Dissolved Gases

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

Fuel Oxygenates

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

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

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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
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 II

Chromium VI	EPA 7196A
	SM 3500-Cr B-2011

Mineral

Alkalinity	SM 2320B-2011
Chloride	SM 4500-Cl- B-2011
	EPA 300.0, Rev. 2.1 (1993)
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
Sulfate (as SO4)	ASTM D516-16
	EPA 300.0, Rev. 2.1 (1993)

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Miscellaneous

Bromide	EPA 300.0, Rev. 2.1 (1993)
Color	SM 2120B-2011
Cyanide, Total	EPA 9014
	SM 4500-CN E-2016
Oil and Grease Total Recoverable	EPA 1664B
Organic Carbon, Total	SM 5310B-2014
Phenols	EPA 420.1 (Rev. 1978)
Specific Conductance	SM 2510B-2011
Sulfide (as S)	SM 4500-S2- F-2011
Turbidity	EPA 180.1, Rev. 2.0 (1993)

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 625.1
	EPA 8270E
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270E
Isophorone	EPA 625.1
	EPA 8270E
Nitrobenzene	EPA 625.1
	EPA 8270E

Nitrosoamines

N-Nitrosodimethylamine	EPA 625.1
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270E
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270E

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WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. TOD KOPYSCINSKI *NY Lab Id No: 10899*
PACE ANALYTICAL SERVICES, LLC - EAST LONGMEADOW, MA
39 SPRUCE STREET
EAST LONGMEADOW, MA 01028

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:

Nutrient

Ammonia (as N)	SM 4500-NH3 C-2011
	EPA 350.1, Rev. 2.0 (1993)
Kjeldahl Nitrogen, Total	SM 4500-NH3 C-2011
Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
	NECi N07-0003
Nitrate-Nitrite (as N)	NECi N07-0003
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
	NECi N07-0003
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)
	SM 4500-P E-2011
Phosphorus, Total	SM 4500-P E-2011

Petroleum Hydrocarbons

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

Phthalate Esters

Benzyl butyl phthalate	EPA 625.1
	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

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Phthalate Esters	
Di-n-butyl phthalate	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
Aroclor 1268 (PCB-1268)	EPA 8082A
Polynuclear Aromatics	
Acenaphthene	EPA 625.1
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270E
Anthracene	EPA 625.1

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Polynuclear Aromatics

Anthracene	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
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

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Priority Pollutant Phenols

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-Chlorophenol	EPA 625.1
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270E
2-Methylphenol	EPA 625.1
	EPA 8270E
2-Nitrophenol	EPA 625.1
	EPA 8270E
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270E
4-Nitrophenol	EPA 625.1
	EPA 8270E
Cresols, Total	EPA 625.1
	EPA 8270E
Pentachlorophenol	EPA 625.1
	EPA 8270E
Phenol	EPA 625.1

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Priority Pollutant Phenols	
Phenol	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
Semi-Volatile Organics	
1,2-Dichlorobenzene, Semi-volatile	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270E
2-Methylnaphthalene	EPA 625.1
	EPA 8270E
Acetophenone	EPA 625.1
	EPA 8270E
Benzoic Acid	EPA 8270E
Dibenzofuran	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
	EPA 524.2
1,3,5-Trimethylbenzene	EPA 8260D
1,3-Dichlorobenzene	EPA 8260D
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260D

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Volatile Aromatics

1,4-Dichlorobenzene	EPA 624.1
2-Chlorotoluene	EPA 8260D
4-Chlorotoluene	EPA 8260D
Benzene	EPA 8260D
	EPA 624.1
	EPA 524.2
Bromobenzene	EPA 8260D
Chlorobenzene	EPA 8260D
	EPA 624.1
	EPA 524.2
Ethyl benzene	EPA 8260D
	EPA 624.1
Isopropylbenzene	EPA 8260D
m/p-Xylenes	EPA 8260D
	EPA 624.1
Naphthalene, Volatile	EPA 8260D
	EPA 624.1
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
Toluene	EPA 8260D

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Volatile Aromatics

Toluene	EPA 624.1
	EPA 524.2
Total Xylenes	EPA 8260D
	EPA 624.1

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
	EPA 524.2
1,2-Dichloropropane	EPA 8260D
	EPA 624.1

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Volatile Halocarbons

1,3-Dichloropropane	EPA 8260D
2,2-Dichloropropane	EPA 8260D
2-Chloroethylvinyl ether	EPA 624.1
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
	EPA 524.2
Chloromethane	EPA 8260D
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260D
	EPA 624.1
cis-1,3-Dichloropropene	EPA 8260D
	EPA 624.1
Dibromochloromethane	EPA 8260D
	EPA 624.1
Dibromomethane	EPA 8260D
Dichlorodifluoromethane	EPA 8260D

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Volatile Halocarbons

Dichlorodifluoromethane	EPA 624.1
Hexachlorobutadiene, Volatile	EPA 8260D
Methylene chloride	EPA 8260D
	EPA 624.1
	EPA 524.2
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

2-Butanone (Methylethyl ketone)	EPA 8260D
2-Hexanone	EPA 8260D
4-Methyl-2-Pentanone	EPA 8260D
	EPA 624.1
	EPA 524.2
Acetone	EPA 8260D
	EPA 624.1
	EPA 524.2

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Volatiles Organics

Carbon Disulfide	EPA 8260D
Cyclohexane	EPA 8260D
Di-ethyl ether	EPA 8260D
Methyl acetate	EPA 8260D
Methyl cyclohexane	EPA 8260D
Tetrahydrofuran	EPA 624.1
	EPA 524.2

Sample Preparation Methods

SM 4500-P B(5)-2011
EPA 5030C
SM 4500-CN B-2016 and C-2016
EPA 3511
EPA 3510C
SM 4500-NH3 B-2011
SM 4500-N Org B-2011 or C-2011
EPA 9010C

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All approved subcategories and/or analytes are listed below:

Amines

Carbazole	EPA 625.1

Chlorinated Hydrocarbon Pesticides

Mirex	EPA 8081B
	EPA 608.3

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
4:2FTS	ENV-SOP-ELON-0004
6:2FTS	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
8:2FTS	EPA 1633 (Draft)
9Cl-PF3ONS	EPA 1633 (Draft)
ADONA	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
HFPO-DA (GenX)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
NEtFOSAA	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
NMeFOSAA	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perflourotridecanoic Acid (PFTrDA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluoro-3-Methoxypropanoic Acid (P	EPA 1633 (Draft)
	ENV-SOP-ELON-0004

Serial No.: 70957

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Perfluorinated Alkyl Acids

Perfluoro-4-Methoxybutanoic Acid (PF	ENV-SOP-ELON-0004
Perfluorobutanesulfonic Acid (PFBS)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorododecanoic Acid (PFDoA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluoroheptanesulfonic Acid (PFHpS	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluoroheptanoic Acid (PFHpA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorohexanesulfonic Acid (PFHxS	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorohexanoic Acid (PFHxA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluoropentanesulfonic Acid (PFPeS	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluoropentanoic Acid (PFPeA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Perfluorotetradecanoic Acid (PFTeDA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004

Serial No.: 70957

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised April 08, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. TOD KOPYSCINSKI *NY Lab Id No: 10899*
PACE ANALYTICAL SERVICES, LLC - EAST LONGMEADOW, MA
39 SPRUCE STREET
EAST LONGMEADOW, MA 01028

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids	
Perfluoroundecanoic Acid (PFUnA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
PFEESA	EPA 1633 (Draft)
	ENV-SOP-ELON-0004
Priority Pollutant Phenols	
3-Methylphenol	EPA 625.1
Volatiles Organics	
1,4-Dioxane	EPA 8260D
	EPA 8270E
	EPA 8270E SIM
Vinyl acetate	EPA 8260D
	EPA 624.1
Sample Preparation Methods	
	EPA 5030C

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39 SPRUCE STREET
EAST LONGMEADOW, MA 01028

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:

Acrylates	
Acrylonitrile	EPA 8260D
Amines	
1,2-Diphenylhydrazine	EPA 8270E
2-Nitroaniline	EPA 8270E
3-Nitroaniline	EPA 8270E
4-Chloroaniline	EPA 8270E
4-Nitroaniline	EPA 8270E
Aniline	EPA 8270E
Benzidines	
3,3'-Dichlorobenzidine	EPA 8270E
Benzidine	EPA 8270E
Characteristic Testing	
Free Liquids	EPA 9095B
Ignitability	EPA 1030
	EPA 1010B
	EPA 1010A
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
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B

Serial No.: 70314

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Chlorinated Hydrocarbon Pesticides

delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Lindane	EPA 8081B
Methoxychlor	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 8270E

Haloethers

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

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All approved analytes are listed below:

Haloethers

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

Metals II

Chromium VI	EPA 7196A

Miscellaneous

Cyanide, Total	EPA 9014
Organic Carbon, Total	Lloyd Kahn Method
	EPA 9060A

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All approved analytes are listed below:

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 8270E
2,6-Dinitrotoluene	EPA 8270E
Isophorone	EPA 8270E
Nitrobenzene	EPA 8270E
Pyridine	EPA 8270E

Nitrosoamines

N-Nitrosodimethylamine	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270E

Petroleum Hydrocarbons

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

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
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1221 (PCB-1221) in Oil	EPA 8082A

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Polychlorinated Biphenyls

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

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
Benzo(k)fluoranthene	EPA 8270E
Chrysene	EPA 8270E
Dibenzo(a,h)anthracene	EPA 8270E
Fluoranthene	EPA 8270E
Fluorene	EPA 8270E

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Polynuclear Aromatic Hydrocarbons

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

Priority Pollutant Phenols

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-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

Semi-Volatile Organics

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
Acetophenone	EPA 8270E

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All approved analytes are listed below:

Semi-Volatile Organics

Benzoic Acid	EPA 8270E
Dibenzofuran	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
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

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All approved analytes are listed below:

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
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
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

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Volatile Halocarbons

Dichlorodifluoromethane	EPA 8260D
Hexachlorobutadiene, Volatile	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

2-Butanone (Methylethyl ketone)	EPA 8260D
2-Hexanone	EPA 8260D
4-Methyl-2-Pentanone	EPA 8260D
Acetone	EPA 8260D
Carbon Disulfide	EPA 8260D
Cyclohexane	EPA 8260D
Di-ethyl ether	EPA 8260D
Methyl acetate	EPA 8260D
Methyl cyclohexane	EPA 8260D
Methyl tert-butyl ether	EPA 8260D
tert-butyl alcohol	EPA 8260D
Tetrahydrofuran	EPA 8260D
Vinyl acetate	EPA 8260D

Sample Preparation Methods

EPA 5035A-L

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Sample Preparation Methods

EPA 5035A-H
EPA 3580A
EPA 3540C
EPA 3546
EPA 3060A
EPA 9010C

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
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Chlorinated Hydrocarbon Pesticides

Mirex	EPA 8081B

Perfluorinated Alkyl Acids

8:2FTS	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
NEtFOSAA	ENV-SOP-ELON-0033
NMeFOSAA	EPA 1633 (Draft)
Perflourotridecanoic Acid (PFTrDA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorododecanoic Acid (PFDoA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluoroheptanoic Acid (PFHpA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorohexanoic Acid (PFHxA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluoropentanoic Acid (PFPeA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033
Perfluorotetradecanoic Acid (PFTeDA)	ENV-SOP-ELON-0033

Serial No.: 70315

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. TOD KOPYSCINSKI *NY Lab Id No: 10899*
PACE ANALYTICAL SERVICES, LLC - EAST LONGMEADOW, MA
39 SPRUCE STREET
EAST LONGMEADOW, MA 01028

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

Perfluoroundecanoic Acid (PFUnA)	EPA 1633 (Draft)
	ENV-SOP-ELON-0033

Volatile Organics

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

Serial No.: 70315

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All approved analytes are listed below:

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA TO-4A
4,4'-DDE	EPA TO-4A
4,4'-DDT	EPA TO-4A
Alachlor	EPA TO-4A
Aldrin	EPA TO-4A
alpha-BHC	EPA TO-4A
beta-BHC	EPA TO-4A
Chlordane Total	EPA TO-4A
Dieldrin	EPA TO-4A
Heptachlor	EPA TO-4A
Heptachlor epoxide	EPA TO-4A
Lindane	EPA TO-4A

Polychlorinated Biphenyls

PCBs and Aroclors	EPA TO-10A
	EPA TO-4A

Polynuclear Aromatics

Acenaphthene	EPA TO-13A
Acenaphthylene	EPA TO-13A
Anthracene	EPA TO-13A
Benzo(a)anthracene	EPA TO-13A
Benzo(a)pyrene	EPA TO-13A
Benzo(b)fluoranthene	EPA TO-13A
Benzo(g,h,i)perylene	EPA TO-13A
Benzo(k)fluoranthene	EPA TO-13A
Chrysene	EPA TO-13A
Dibenzo(a,h)anthracene	EPA TO-13A

Serial No.: 70316

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All approved analytes are listed below:

Polynuclear Aromatics

Fluoranthene	EPA TO-13A
Fluorene	EPA TO-13A
Indeno(1,2,3-cd)pyrene	EPA TO-13A
Naphthalene	EPA TO-13A
Phenanthrene	EPA TO-13A
Pyrene	EPA TO-13A

NEW YORK STATE Department of Health

Serial No.: 70316

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Appendix D (of the SCWP) – Green Remediation Best Management Practices: Site Investigation

United States Environmental Protection Agency

Office of Land and Emergency Management (5203P)
EPA 542-F-16-002 September 2016 Update

Green Remediation Best Management Practices: Site Investigation and Environmental Monitoring

A fact sheet about the concepts and tools for using best management practices to reduce the environmental footprint of activities associated with assessing or remediating contaminated sites

www.cluin.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 emissions.
- Reduce water use and preserve water quality.
- Conserve material resources and reduce waste.
- Protect land and ecosystem services.



Overview

The need for site investigation is common to cleanups under any regulatory program. Investigative activities 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 data for assessing potential risk to human health or the environment.
- Gather data for determining if a remedial or removal action should be taken.
- Identify site characteristics affecting remedial design, construction or operation.

Site investigation as well as long-term environmental monitoring typically involve a range of technologies and techniques to gather field measurements and collect analytical samples of soil and groundwater and often surface water, sediment, soil gas or indoor air. Investigation also may involve searching for underground storage tanks, drums or other buried objects, or evaluating demolition material containing asbestos, lead-based paint or other toxic products. Many of the same techniques and technologies may be used in later stages of a cleanup to evaluate ongoing performance of a remedy; determine the need for any modification to a remedial system; or track factors influencing anticipated closeout of a cleanup project. At certain points, site investigation and environmental monitoring both rely on data analysis or verification conducted by offsite laboratories.



Water monitoring at the New Idria Mercury Mine Superfund site in California involves use of time-interval sampling devices powered by solar energy. Collected sampling data are transmitted via satellite to a website accessible by project staff. This approach supplies a renewable source of onsite energy and reduces the frequency of staff visits to this remote site. Ongoing investigation of this site led to removal actions in 2011 and 2015.

Project Planning

Integration of green remediation BMPs early during the project design phase will help reduce cumulative environmental footprints of a cleanup. The BMP integration process involves selecting BMPs most suitable for the site's unique contamination scenario, potential remedies and anticipated site reuse. BMPs to be considered when planning a site investigation include:

- Schedule activities for suitable seasons to reduce the amount of fuel needed for heating or cooling equipment and supplies.
- Select service providers, product suppliers and analytical laboratories from the local area and consolidate the service and delivery schedules.

The ASTM *Standard Guide for Greener Cleanups* outlines a process for identifying, screening and selecting BMPs to minimize the environmental footprint of site-specific cleanup activities.[2]

- Identify local sources of trucks and machinery equipped with advanced emission controls and of cleaner alternative fuels.[3]
- Identify the nearest facility to be used for disposing of hazardous waste.
- Establish electronic networks for data transfers, team decisions and document preparation, and select electronic products through tools such as the Electronic Product Environmental Assessment Tool (EPEAT).[4]
- Reduce travel through increased teleconferencing and compressed work hours.
- Select facilities with green policies for worker accommodations and meetings.
- Integrate sources of onsite renewable energy to power hand-held devices, portable equipment, and stationery monitoring systems.

Product and service acquisitions provide opportunities to integrate BMPs when planning a site investigation. New contracts awarded by EPA for remediation environmental services at Superfund sites, for example, now require contractors to explore and implement strategies to reduce energy and water usage, promote carbon neutrality, promote industrial materials reuse and recycling, and protect and preserve land resources.[5]

Development of a well-conceived dynamic sampling plan can help assure that data truly representing a site are collected at the project onset, consequently minimizing remobilization of field crews and equipment. Systematic planning, which is 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.

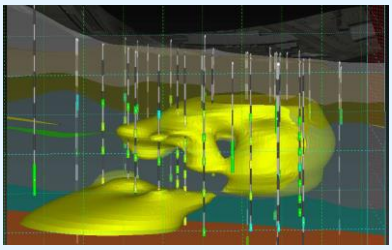
Field Activities

Fewer field mobilizations typically lead to reduced fuel consumption and associated air emissions and often less disturbance to the land and local ecosystems. BMPs that can help minimize mobilization during site investigation and environmental monitoring include:

- Use in situ data loggers to monitor water quality parameters and water levels, as an alternative to frequent sample collection or physical measurement.
- Install solar-powered telemetry systems to remotely transmit logging data.
- Use dynamic work plans involving real-time field measurements, which can immediately provide data to help determine the next activity during a given sampling event.

Technologies for collecting real-time data are typically non-invasive or minimally invasive; examples include:

- Direct sensing equipment such as the membrane interface probe, laser-induced or X-ray fluorescence sensors and cone penetration tests.
- Immunoassay, colorimetric and other field test kits to screen soil and groundwater contaminants.
- Portable vapor/gas detection systems using photoionization or flame ionization for screening purposes.
- Soil gas surveys involving instruments such as SUMMA canisters to determine the presence, composition and distribution of volatile organic compounds (VOCs) in the vadose zone and water table.
- Portable gas chromatography/mass spectrometry for analyzing fuel-related compounds and VOCs in soil and groundwater.
- Ground penetrating radar, magnetometers, and other geophysical survey instrumentation to locate metal objects and delineate disposal areas.



At Well 12A within the Commencement Bay-South Tacoma Channel Superfund site in Washington, high-resolution characterization data and 3D visualization were used to develop a robust CSM. The CSM helped quantify contaminant mass in soil and groundwater, delineate discrete treatment zones and prioritize remediation design approaches. This refined, minimally invasive strategy for site characterization significantly accelerated site cleanup, saving an estimated $1 million in treatment costs. Additionally, use of passive sampling devices for long-term monitoring avoided generation of purge water while saving more than $100,000 in the first five years of monitoring alone.

Other BMPs typically applying to site investigation and environmental monitoring focus on conserving and protecting water and using environmentally friendly products, such as:

- Deploy passive sampling devices, which involve no well purging.
- Use supplemental techniques to map the source and extent of a contaminated groundwater plume, such as analyzing core samples taken from rapid-growing trees.
- Employ a closed-loop graywater washing system to decontaminate trucks or machinery.
- Steam-clean or use phosphate-free detergents instead of organic solvents or acids to decontaminate sampling equipment.
- Use plastic sheeting or portable wash pads to contain and collect decontamination fluids and prevent their entrance into storm drains or groundwater.

- Treat potentially contaminated purge water through use of technologies such as activated carbon filtration prior to discharge to storm drains or waterways.
- Quickly restore disturbed areas of vegetation serving as stormwater controls.
- Use biodegradable lubricants and hydraulic fluids.
- Choose groundwater monitoring equipment made of noncorrosive material.

Yet other BMPs concern design and installation of groundwater wells to be used for sampling and monitoring. Relevant BMPs include:

- Design investigative wells in ways that allow for maximum reuse during remediation or to meet water demands of ongoing or future site activities.
- Integrate a horizontal well network where feasible as an alternative to a greater number of vertical wells.
- Choose a multi-port sampling system in wells intended for monitoring, to minimize the total number of wells needing to be installed.
- Use minimally invasive drilling techniques such as direct-push or sonic technology whenever feasible to reduce drilling duration, avoid or minimize use of water, and prevent or reduce generation of cuttings and associated disposal of investigation-derived waste (IDW).
- Use dual tube technology during drilling, which allows collection of continuous soil cores and later reuse of the same boreholes for site investigation, remediation or monitoring.
- Use an electric top drive system to minimize use of hydraulic fluids when rotary drills are used.
- Segregate and screen drill cuttings for potential use such as onsite backfill if allowed under applicable state or federal cleanup programs; use of an organic vapor analyzer may significantly improve or accelerate the screening process.
- Use environmentally friendly pipe dope for drill pipes and casings.
- Emplace mats to limit ground surface disturbance at drilling locations.



Use of passive diffusion bag (PDB) sampling techniques in 56 wells at the Joint Base Lewis McChord Superfund site in Washington significantly reduced the environmental footprint of sampling activities. When compared to using low-flow sampling techniques in other wells, PDB use achieved a:

- 54% reduction in energy used.
- 55% reduction in greenhouse gas emissions.
- 63% reduction in criteria pollutants.

The footprint reductions were driven by demonstrated reductions in the amount of field time, which leads to fewer vehicle miles traveled and associated fuel consumption. A two-person team was able to sample 12 of the wells per day when using PDBs but only five wells per day if using low-flow methods.[6]

Materials and Waste Management

Site investigation and environmental monitoring activities typically involve using an assortment of manufactured products such as personal protective equipment (PPE), sample containers and routine business materials. BMPs concerning green purchasing of such products include:

- Choose products with recycled and biobased contents such as agricultural or forestry waste instead of petroleum-based ingredients.
- Choose products, packing material and equipment that have reuse or recycling potential.
- Choose products manufactured through processes involving nontoxic chemical alternatives.

A comprehensive list of tools and resources for materials management decision-making is available in EPA's *Sustainable Materials Management in Site Cleanup* engineering issue paper.[7]

IDW generation and management frequently account for a significant portion of the environmental footprint of site investigation. IDW includes drill cuttings, well purge water, spent carbon from filtration equipment, reagents used with environmental field test kits, non-reusable or contaminated PPE and solutions for decontaminating non-disposable PPE and equipment. Reducing the volume of generated IDW will decrease the need for waste containers such as 55-gallon storage drums and for treating IDW onsite or disposing of it at a waste facility. Recommended BMPs to reduce the volume of routine waste or IDW, while often decreasing materials consumption, include:

- Compress the number of days needed for a given round of sampling.
- Minimize the need for disposable single-use items such as plastic bags.
- Designate collection points for items that are locally recyclable, such as metal, plastic or glass containers and paper or cardboard.
- Select test kits that generate less waste, such as soil samplers with reusable handles for coring syringes.
- Collect hydraulic fluids and lubricants for recycling at suitable local facilities.
- Maximize use of environmentally friendly additives such as ascorbic acid to preserve or stabilize collected samples, if compatible with target analytes and anticipated analytical methods.[10]

Use of EPA's *Spreadsheets for Environmental Analysis*[8] to estimate the footprint of cleanup activities at the Grants Chlorinated Solvents Plume Site indicated that laboratory analysis (including sample collection and preparation and offsite transport) accounted for approximately 10% of the energy- and carbon dioxide (equivalent)-related footprint of operating, maintaining and monitoring the remedy.[9] As a result, optimization of the sampling program is underway to reduce the frequency of sample collection and analysis.

Laboratory Support

Use of fixed-base laboratories for analytical services may significantly contribute to the environmental footprint of site investigation and environmental monitoring when considering offsite as well as onsite contributions. Green remediation BMPs concerning analytical support include:

- Use a mobile laboratory or portable analytical equipment, particularly for screening purposes and when rapid analytical results are needed.
- Specify EPA analytical methods involving procedures that need relatively low volumes of samples or solvents and generate less waste, such as solid phase micro extraction (SPME), pressurized fluid extraction, microwave extraction, and supercritical fluid extraction when possible. For example, SPME is a single-step process using little or no solvents and taking up to 70% less time.
- Choose fixed laboratories demonstrating a strong commitment to environmental performance, such as routine use of management practices identified by the International Institute for Sustainable Laboratories.[11]

Attributes of high-performing laboratories include:

- Optimized ventilation rates in light of the mixing factor of particular pollutants being removed from the laboratory; simply maximizing ventilation results in unnecessary energy expenditure (and may diminish safety conditions).
- Use of energy recovery devices and systems to reduce energy consumption for interior heating and cooling.
- Use of energy-efficient equipment for ventilation, refrigeration and lighting.
- Use of energy consumption controls such as programmable thermostats, window glass tinting and ample insulation.
- Cooling tower operation with a high concentration ratio, which increases the number of times water circulates before it is bled off and discharged; cooling accounts for an estimated 30-60% of water used in multipurpose laboratories.[12]
- Integration of solenoid valves, timers or other controls on equipment used in processes requiring flowing water.
- Use of less hazardous materials; for example, toluene may substitute for benzene as a solvent.
- Implementation of purchasing strategies and inventory controls that minimize disposal of excess materials.
- Recycling of liquid waste; for example, non-halogenated solvents may be used offsite as fuel blending feedstock.
- Recycling of materials such as clean glass or plastic containers, drums, electronics, and steel or aluminum instrumentation.



Acquisition of laboratory services supporting remedial investigation at the Diaz Chemical Corporation Superfund site in Holley, New York, included specifications meeting EPA greener cleanup policy. The selected laboratory employs practices such as:

- Recycling all paper products and shipping materials.
- Using energy-efficient lighting.
- Maintaining a paperless reporting and invoicing program.
- Minimizing waste through use of EPA-approved microscale methods.

Similar procurement requirements for subcontractor drilling activities reduced the investigative footprint by:

- Using direct-push technology.
- Deploying trucks equipped with advanced emission controls.
- Minimizing waste through waste oil and scrap recycling.

This fact sheet provides an update on information compiled in the December 2009 "Site Investigation" fact sheet (EPA 542-F-09-004), in collaboration with the Greener Cleanups Subcommittee of the 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.

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Appendix E (of the SCWP) – Community Air Monitoring Plan (CAMP)

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 F (of the SCWP) – Hanson Van Vleet, PLLC, Focused Phase 2 Environmental Site Assessment (ESA) Report, 2024

HANSON

VAN VLEET, PLLC

GEOLOGIC & ENVIRONMENTAL CONSULTANTS

March 12, 2024

Mr. Ed Brookmyer
Bare Ground Systems
43 Juniper Lane
Framingham, MA 07101

RE: Focused Phase 2 Environmental Site Assessment
6 Old River Road
Glenmont, New York

Dear Mr. Brookmyer:

Hanson Van Vleet, PLLC (HVV) is providing this letter report to document the Limited Phase 2 Environmental Site Assessment (ESA) performed at the above-referenced property (Property). The site location is shown on Figure 1. The purpose of this Limited Phase 2 ESA was to determine if any unmitigated petroleum release to soil or groundwater from the former gasoline station at 239 River Road, located adjacent and upgradient to the subject Property have had any adverse impact on the subsurface environment at the Property, to assess the condition of the mounds of imported fill disposed in the southern part of the Property, and to assess the water quality at the onsite drinking water well. A description of the investigation is provided below.

BACKGROUND

The Phase 2 ESA was based on the results of the Phase 1 Environmental Site Assessment Report, dated January 12, 2024, including a review of historical records and current site conditions. The specific boring and temporary monitoring well locations completed as part of the Phase 2 ESA were selected based on information gathered during the Phase 1 ESA, and during a Ground Penetrating Radar (GPR) survey of the Property. The Phase I ESA Report identified the following recognized environmental conditions (RECs) at the Property:

- Historic city directory records revealed a former gasoline station at 239 River Road, was located adjacent to the west and directly upgradient of the subject Property from the early 1950s to the late 1970s, prior to environmental regulations. No records of underground storage tank installation or removal, and no records of site investigations of potential historic petroleum spills were found for the site. Based on the lack of environmental records and the upgradient location, the former gasoline station at 239 River Road represents a REC to the subject Property.
- The former Beacon Island fly ash landfill located to the east and downgradient of the subject Property represents a potential threat to the water quality obtained from the on-site drinking water well. No records of the well construction or water quality testing of the drinking water well were found during the course of this assessment.

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- Several small mounds of imported fill consisting of soil with small amounts of asphalt and C&D debris were located in the wooded area in the southern part of the Property.

The Phase 2 ESA included a GPR survey to identify any potential subsurface utility conflicts. The methods and results of the Phase 2 investigation are summarized in this letter report.

GROUND PENETRATING RADAR (GPR) UTILITY CLEARANCE

Methods – GPR Utility Clearance

Prior to the start of any subsurface work, Dig Safely NY was contacted to mark out any public subsurface utilities. HVV retained Bloodhound Underground Utility Locators (Bloodhound), of Hauppauge, New York, to provide equipment and a technician to perform the GPR survey to scan the proposed boring locations for the presence of underground private utilities or unmarked or mis-marked public utilities. Bloodhound utilized an ImpulseRadar PinPointR subsurface interface radar and related transducers to scan the Property. A real-time system display allows for the marking of subsurface detections and anomalous signals on the ground in the field. The data was also recorded for later downloading and evaluation.

The GPR survey was performed on February 15, 2024. The GPR survey area was selected to provide subsurface utility clearance for the potential drilling locations. The GPR survey area included a grassy area and broken asphalt area resembling a rectangular shape and measuring approximately 40 feet wide by 275 feet long along the western edge of the Property. The GPR survey area is depicted in Figure 2.

Results – GPR

The utilities identified by Bloodhound included communication cables and stormwater drainage pipes. The subsurface communication cables were generally oriented north to south along the western edge of the Property. The stormwater drainage pipes were generally oriented west to east and connected in a straight line between two stormwater catch basins and continued further west under Old River Road. The four potential drilling locations were adjusted slightly based on the identification of subsurface utilities. No other GPR anomalies were encountered that would indicate an impediment to the proposed drilling locations. A summary of the GPR findings is provided in Appendix A.

SOIL MOUND INVESTIGATION

Methods – Soil Mound Investigation

On February 16, 2024, Mr. Steven Catalano, P.G., environmental geologist of HVV, investigated the mounded areas of imported fill. The investigation was completed by assessing the mound contents to 2 feet below the top of the mounds at 15 different mounds in the southern part of the Property. The samples were inspected for evidence of staining and odors and screened in the field with a photoionization detector (PID) that measures volatile organic compound (VOC) vapors associated primarily with petroleum products.

Results – Soil Mound Investigation

The contents of the mounds included broken asphalt, concrete chunks and dark brown silt with sand and clay. No visual evidence, olfactory evidence or elevated PID detections that would be indicative of contamination were identified. Based on the lack of physical evidence of contamination and lack of elevated PID detections of VOCs, no soil samples were collected for laboratory analysis.

SOIL BORING INSTALLATION ACTIVITIES

Methods – Installation of Soil Borings

On February 16, 2024, four soil borings, B-1, B-2, B-3 and B-4, were installed to investigate the subsurface condition at the Property. The soil borings were installed adjacent to the western edge of the Property between the southern and northern property driveways. The locations of all four soil borings were selected to intercept any potential unmitigated petroleum impacts to soil or groundwater from the former gasoline station located at 239 River Road. Soil borings B-1 through B-3 were drilled in the broken gravel areas of the Property and soil boring B-4 was drilled within the grass area adjacent to the northern property driveway. The locations of the soil borings are shown on the attached Figure 3.

The soil borings were installed by Cascade Remediation Services, LLC, of Schenectady, New York, using direct push GeoProbe® type methods. All soil boring installation activities were supervised by Mr. Steven Catalano, P.G. and environmental geologist of HVV. Continuous soil samples were collected, logged and evaluated for the presence of VOCs by a PID from the surface to the base of each boring. Mr. Steven Catalano inspected and logged all soil samples in the field. Samples were inspected for evidence of petroleum (i.e., staining, odors, etc.), and screened in the field with a PID that measures VOC vapors associated with petroleum products. No evidence of VOCs, staining or odors were identified, so a soil sample was retained for laboratory analysis from the zone directly above the water table interface.

Soil samples were placed in laboratory-provided sampling jars, placed in an iced cooler and delivered under formal chain-of-custody procedures to Phoenix Environmental Laboratories, Inc., a New York State ELAP-accredited analytical laboratory, of Manchester, Connecticut. Each soil sample collected was analyzed for per Environmental Protection Agency (EPA) Methods 8260 Spills Technology and Remediation Series (STARS), semi-volatile organic compounds (SVOCs) per EPA Method 8270 STARS and and RCRA 8 Metals per EPA Methods 3050, 6010 and 7471.

All four soil borings encountered similar conditions, including the absence of petroleum odors and the absence of VOC detections exceeding background concentrations with the PID. Saturated soils were encountered in all four soil borings at a depth of 10 feet below grade. A discrete soil sample was collected immediately above the groundwater interface at each of the soil borings from 8 to 10 feet below grade. All four soil borings were installed to a total depth of 20 feet below grade.

Soil borings B-1 and B-2 encountered dark brown clay with some silt and little very fine sand to 2 feet below grade. Mottled light grayish brown and orangish brown clay with little silt was encountered from 2 to 5 feet below grade at soil borings B-1 and B-2. Mottled light grayish brown and orangish brown clay was encountered from 5 to 13 feet below grade at soil borings B-1 and B-2. Light gray clay was encountered from 13 to 20 feet below grade at soil borings B-1 and B-2.

Soil boring B-3 encountered dark brown clay with some silt and very fine sand to 3 feet below grade. Light gray clay with some silt and very fine sand was encountered from 3 to 3.5 feet below grade at soil boring B-3. Mottled light grayish brown and orangish brown clay with little silt was encountered from 3.5 to 13 feet below grade at soil boring B-3. Light gray clay was encountered from 13 to 20 feet below grade at soil boring B-3.

Soil borings B-4 encountered dark brown clay with some silt and very fine sand to 2.5 feet below grade. Mottled light grayish brown and orangish brown clay with little silt was encountered from 2.5 to 13 feet below grade at soil boring B-4. Light gray clay was encountered from 13 to 20 feet below grade at soil boring B-4.

Results – Soil Sample Laboratory Analysis

Discrete soil samples were collected for laboratory analysis from borings B-1, B-2, B-3 and B-4 at a depth of 8 to 10 feet below grade. The soil samples were submitted for laboratory analyses of VOCs by EPA Method 8260 STARS, SVOCs by EPA Method 8270 STARS and RCRA 8 Metals per EPA Methods 3050, 6010 and 7471. The laboratory analytical report and chain-of-custody documentation are attached as Appendix C.

Table 1 below summarizes the Soil Sample Analytical Results.

Table 1
Summary of Soil Analytical Results

Parameter	B-1	B-2	B-3	B-4	Subpart 375-6.8(a) Soil Unrestricted Use Cleanup Objective
VOCs STARS per EPA Method 8260 (parts per billion)					
1,2,4-Trimethylbenzene	ND	ND	ND	ND	3,600
1,3,5-Trimethylbenzene	ND	ND	ND	ND	8,400
Benzene	ND	ND	ND	ND	60
Ethylbenzene	ND	ND	ND	ND	1,000
Isopropylbenzene	ND	ND	ND	ND	--
m&p-Xylene	ND	ND	ND	ND	--
Methyl t-Butyl Ether (MTBE)	ND	ND	ND	ND	930
Naphthalene	ND	ND	ND	ND	12,000
n-Butylbenzene	ND	ND	ND	ND	12,000
n-Propylbenzene	ND	ND	ND	ND	3,900
o-Xylene	ND	ND	ND	ND	--
p-Isopropyltoluene	ND	ND	ND	ND	--
sec-Butylbenzene	ND	ND	ND	ND	11,000
tert-Butylbenzene	ND	ND	ND	ND	5,900
Toluene	ND	ND	ND	ND	700
Total Xylenes	ND	ND	ND	ND	260
SVOCs STARS per EPA Method 8270 (parts per billion)					
Acenaphthene	ND	ND	ND	ND	20,000
Acenaphthylene	ND	ND	ND	ND	100,000
Anthracene	ND	ND	ND	ND	100,000
Benz(a)anthracene	ND	ND	ND	ND	1,000
Benzo(a)pyrene	ND	ND	ND	ND	1,000
Benzo(b)fluoranthene	ND	ND	ND	ND	1,000
Benzo(ghi)perylene	ND	ND	ND	ND	100,000
Benzo(k)fluoranthene	ND	ND	ND	ND	800
Chrysene	ND	ND	ND	ND	1,000
Dibenz(a,h)anthracene	ND	ND	ND	ND	330
Fluoranthene	ND	ND	ND	ND	100,000
Fluorene	ND	ND	ND	ND	30,000
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	500
Naphthalene	ND	ND	ND	ND	12,000
Phenanthrene	ND	ND	ND	ND	100,000
Pyrene	ND	ND	ND	ND	100,000
RCRA 8 Metals per EPA Methods 3050, 6010 and 7471 (parts per million)					
Arsenic	8.14	8.88	10.1	7.87	13
Barium	229	175	153	214	350
Cadmium	0.92	0.9	0.86	0.92	2.5
Chromium	31.8	26.9	31.7	35.4	--
Lead	18.4	18.9	19.3	19.1	63
Mercury	ND	ND	ND	ND	0.18
Selenium	ND	ND	ND	ND	3.9
Silver	ND	ND	ND	ND	2

Conclusions – Soil Sample Laboratory Analysis

The soil samples collected at the groundwater interface from soil borings B-1, B-2, B-3 and B-4 had no detectable concentrations of VOCs, SVOCs or metals exceeding the respective laboratory method detection limits and/or NYSDEC 6 NYCRR Part 375 Soil Unrestricted Use Cleanup Objective.

The field findings and laboratory analysis results of soil samples collected from the four soil borings installed at the Property do not indicate the presence of petroleum contamination in soil along the western edge of the Property up to 20 feet below grade.

TEMPORARY MONITORING WELL INSTALLATION ACTIVITIES

Methods – Monitoring Well Installation and Groundwater Sampling

A temporary groundwater monitoring well was installed in soil boring B-3 to evaluate potential impacts to groundwater. The well was constructed of a 1-inch diameter threaded PVC riser with 10 feet of 0.010-inch slotted screen at the base of the well construction. The temporary groundwater monitoring well was set to a depth of 15 feet below grade with solid PVC riser pipe above the screened portion of the groundwater well. Upon collection of water sample collection activities, the well was removed and the boring was backfilled with native cuttings and bentonite chips.

HVV collected a groundwater sample from the temporary groundwater monitoring well installed during this investigation immediately after well installation on February 16, 2024. The groundwater samples were collected using new, pre-cleaned dedicated high-density polyethylene (HDPE) bailers and new, clean monofilament line. Standard NYSDEC-recommended sampling procedures were utilized. At least three well volumes of water were purged from the monitoring well prior to collection of the groundwater sample. Each sample was placed in laboratory-provided hydrochloric acid preserved 40-milliliter (mL) glass volatile organic analysis (VOA) vials, 1-liter unpreserved glass bottles and a 250-ml plastic bottle, placed in an iced cooler and delivered under formal chain-of-custody procedures to Phoenix Environmental Laboratories, Inc., a New York State ELAP-accredited analytical laboratory of Manchester, Connecticut.

Results – Groundwater Sample Analysis

The groundwater samples were analyzed for VOCs per EPA Method 8260 STARS, SVOCs per EPA Method 8270 STARS and RCRA 8 Metals per EPA Methods 3050, 6010 and 7471. The laboratory analytical report and chain-of-custody documentation are attached as Appendix C.

Table 2 below summarizes the groundwater sample analytical results.

Table 2
Summary of Groundwater Analytical Results
Samples Collected on February 16, 2024

Parameter	B-3 Water	6 NYCRR Part 703 Groundwater Standards
VOC STARS per EPA Method 8260 (PPB)		
1,2,4-Trimethylbenzene	ND	5
1,3,5-Trimethylbenzene	ND	5
Benzene	ND	1
Ethylbenzene	ND	5
Isopropylbenzene	ND	5
m&p-Xylene	ND	--

Methyl t-butyl ether (MTBE)	ND	--
Naphthalene	ND	10
n-Butylbenzene	ND	5
n-Propylbenzene	ND	5
o-Xylene	ND	5
p-Isopropyltoluene	ND	5
sec-Butylbenzene	ND	5
tert-Butylbenzene	ND	5
Toluene	ND	5
Total Xylenes	ND	5
SVOC STARS per EPA Method 8270 (PPB)		
2-Methylnaphthalene	ND	--
Acenaphthene	ND	20
Acenaphthylene	ND	--
Anthracene	ND	50
Benz(a)anthracene	ND	0.002
Benzo(a)pyrene	ND	--
Benzo(b)fluoranthene	ND	0.002
Benzo(ghi)perylene	ND	--
Benzo(k)fluoranthene	ND	0.002
Chrysene	ND	0.002
Dibenz(a,h)anthracene	ND	--
Fluoranthene	ND	50
Fluorene	ND	50
Indeno(1,2,3-cd)pyrene	ND	0.002
Naphthalene	ND	10
Phenanthrene	ND	50
RCRA 8 Metals per EPA Methods 3050, 6010 and 7471 (parts per million)		
Arsenic	ND	0.025
Barium	0.098	1
Cadmium	ND	0.005
Chromium	ND	0.05
Lead	ND	0.025
Mercury	ND	0.0007
Selenium	ND	0.001
Silver	ND	0.05

Conclusions – Groundwater Sample Analysis

The groundwater sample collected from the temporary groundwater monitoring well installed in soil boring B-3 had no detectable concentrations of VOCs, SVOCs or metals exceeding the respective laboratory method detection limits and/or 6 NYCRR Part 703.

The field findings and laboratory analysis results of groundwater samples collected from the temporary groundwater monitoring well installed in soil boring B-3 at the Property do not indicate the presence of petroleum contamination in groundwater along the western edge of the Property within the perched groundwater aquifer.

EXISTING DRINKING WATER WELL SAMPLE

The collection of a water sample of the onsite drinking water well was recommended based on the results of the Phase 1 Environmental Site Assessment Report, dated January 12, 2024. No information regarding the date of installation, construction, or condition of the well was available. Deficiencies identified during inspection of the wellhead included inadequate casing elevation

above grade surface, potentially corroded and deteriorated casing, and an inadequate well cap that does not provide a sufficient sanitary seal.

The tap utilized for sampling the well was located prior to a pressure tank but after a particulate filter located within a utility room at the Property. The particulate filter was removed during sampling activities to collect a representative sample from the aquifer without any filtration .

The water well was initially purged at a rate of 2.5 gallons per minute (gpm) for approximately 2.5 hours on February 15, 2024, to clear fines and pump several well volumes to collect a representative sample from the surrounding aquifer. Turbidity was measured at 180 Nephelometric Turbidity Units (NTU) at the conclusion of purging on February 15, 2024. On February 16, 2024, additional purging at a rate of 2.5 gpm continued for approximately 5 hours until the turbidity was measured at 3.5 NTU, below the NYS drinking water standard of 5 NTU. The water sample was collected on February 16, 2024. The water samples were placed in laboratory-provided containers, placed in an iced cooler and delivered under formal chain-of-custody procedures to Phoenix Environmental Laboratories, Inc., a New York State ELAP-accredited analytical laboratory of Manchester, Connecticut.

The drinking water analytical methods, and parameters selected to be tested, were based on typical contaminants that may be present related to the historical and current use of the surrounding properties, including automotive service and dry-ash landfilling. The water samples were analyzed for volatile organic compounds (VOCs) per EPA Method 524.2, semi-volatile organic compounds (SVOCs) per EPA Method 525.3, Polychlorinated Biphenyls (PCBs) per EPA Method 508, Metals per EPA Methods 200.7 and 200.8; several general wet chemistry parameters by various methods, Total Coliforms and E-Coli per Standard Method 9223B-04 and 18-Parameter PFAS list per EPA Method 537.1. The results of the laboratory analyses are included in Appendix A.

Results of Laboratory Analyses

The results of laboratory analyses of the water sample collected from the pre-existing water well identified concentrations of several VOCs, including 1,1-Dichloroethane, cis-1,2-Dichloroethene, Trichloroethene and Vinyl chloride, exceeding the laboratory method reporting limit (MRL). Of the four VOCs that exceeded the laboratory MRL, cis-1,2-Dichloroethene and Trichloroethene were detected at concentration of 14 and 8.7 micrograms per liter (µg/L), respectively, which exceed the NYSDOH Maximum Contaminant Level (MCL) of 5 µg/L. No other VOCs were detected at concentrations that exceed the NYSDOH MCL.

The results of laboratory analyses of the water sample collected from the pre-existing water well indicated no detectable concentrations of SVOCs inclusive of the 10 NYCRR Subpart 5-1 Drinking Water Regulations. The results of metals analyses indicated no detected concentrations for regulated metals inclusive of the 10 NYCRR Subpart 5-1 Drinking Water Regulations, and low-level detections of common, naturally occurring metals (barium, calcium, copper, iron, hardness, lead, magnesium, manganese and zinc) below secondary drinking water standards.

Sodium was detected at a concentration of 109 milligrams per liter (mg/L), but an MCL has not been established by the New York State Department of Health (NYSDOH). Hardness was identified at a concentration of 355 mg/L but an MCL has not been established by the NYSDOH.

The results of analyses of wet chemistry parameters indicated these parameters were either not detected exceeding the MRL or at normal levels within drinking water standards, except the total dissolved solids (TDS) concentration of 560 exceeded the secondary goal of 500 mg/L. The results of bacterial analyses indicated Total Coliform was present, with E. Coli absent. The presence of

Total Coliform in the drinking water sample represents an exceedance of NYSDOH Drinking Water Standards.

Discussion of Lab Analyses Results

VOC parameters indicative of impacts related to the use and release of solvents were identified in the drinking water sample. The VOCs, cis-1,2-Dichloroethene and Trichloroethene, were detected at concentrations of 14 and 8.7 micrograms per liter (µg/L), respectively, which exceed the NYSDOH MCL of 5 µg/L.

The presence of Total Coliform, with the absence of E. Coli, indicates sewage is not impacting the drinking water well. Total Coliform may be present due to undisinfected piping within the facility or may indicate the wellhead for the drinking water well is open to the environment, allowing dirt or insects to enter the wellhead.

Total dissolved solids were identified at a concentration of 560 mg/L, which exceeds the secondary goal of 500 mg/L. Hardness was identified at a concentration of 355 mg/L. The combination of elevated concentrations of TDS and hardness indicates the water is considered hard, which may leave deposits and films on fixtures and piping and cause particulate filters to wear out sooner than is typical. The issues with elevated TDS and hardness concentrations are considered cosmetic and nuisance problems and should not affect the safety of water usage.

Sodium was detected at a concentration of 109 mg/L, but an MCL has not been established by the NYSDOH. However, the 10 NYCRR Subpart 5-1 Drinking Water regulations specify that water containing more than 20 mg/L of sodium should not be used for drinking by people on severely restricted sodium diets and water containing more than 270 mg/L of sodium should not be used for drinking by people on moderately restricted sodium diets.

RECOMMENDATIONS

Due to the elevated concentrations of VOCs, consumption of the drinking water at the Property should immediately be discontinued by any person. Clear and visible placarding is recommended in clear and visible locations where water is used throughout the Property to inform potential users that the water is not potable and should not be consumed. If the well is planned for potable use, treatment of the VOCs would be required with confirmatory sampling to ensure VOC concentrations have been decreased below the applicable NYSDOH MCL.

Additionally, the drinking water should be discontinued due to the presence of Total Coliform. The presence of total coliform in the drinking water is a proxy for potential biological contamination within the well, including harmful forms of bacteria. If the water well is desired for drinking usage, the well and plumbing should be chlorinated to assist in identifying if the Total Coliform identified in the initial sample was within the well, piping and appurtenances or if there is an issue with the integrity of the sanitary seal or structural integrity of the well. Retesting for Total Coliform and E. Coli should be performed after the chlorine residual has dissipated from the water.

Deficiencies identified during the inspection of the drinking water wellhead included inadequate casing elevation above grade surface, potentially corroded and deteriorated casing, and an inadequate well cap that does not provide a sufficient sanitary seal. If the well is planned for consumptive use and VOCs can be successfully decreased to concentrations in compliance with NYSDOH requirements, the well casing should be raised by a licensed water well driller to at least

18 inches above grade and a water-tight well cap with functional bolts should be installed to act a more effective seal to prevent surface water intrusion into the well.

Under New York State's Navigation and Environmental Conservation Law, the detections of VOCs exceeding applicable NYSDEC groundwater standards require notification to the NYSDEC Spill hotline. The current property owner must be made aware of the exceedance of groundwater standards and their responsibility to report the spill. Upon notification of the contaminant detections and exceedances of state groundwater standards, the Property owner must report the findings to the NYSDEC Spill Hotline at (800) 457-7362. If desired, HVV can be made the point of contact for correspondence with the NYSDEC. HVV should be kept informed of the status of reporting the analytical results to the NYSDEC Spill Hotline. Other persons with knowledge of a spill, leak, or discharge are required to report the incident if the property owner neglects their responsibility to do so.

A conclusive source has not been identified in association with the VOC detections. Additional investigation may be necessary to fully delineate the source and extent of the petroleum contamination identified in groundwater at the Property, or to achieve spill case closure with the NYSDEC.

LIMITATIONS

This Focused Phase II ESA Report was prepared for Bare Ground Systems. The results provided by HVV in this Focused Phase II ESA Report are based solely on the information reported in this document. Future investigative site information that was not available to HVV at the time of this investigation may result in a modification of the conclusions stated above. The conclusions and recommendations presented are based upon the current regulatory climate and may require revision if future regulatory changes occur. This investigation and report have been conducted in accordance with generally accepted hydrogeologic practices. No warranty, expressed or implied, is made.

If you have any questions, please contact me at (518) 371-7940.

Very truly yours,
Hanson Van Vleet, PLLC

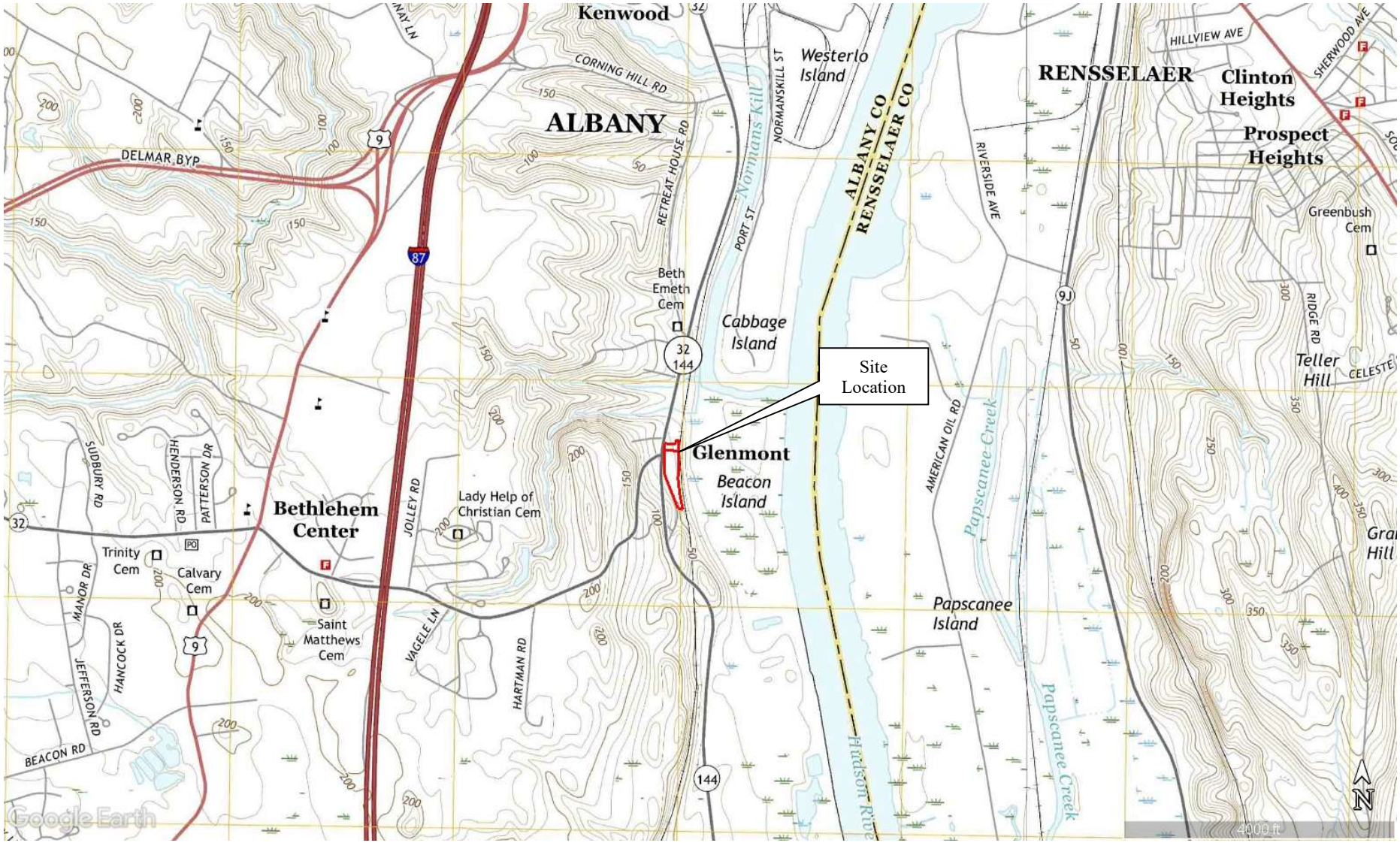


James Gironda, P.G
Senior Hydrogeologist

ATTACHMENTS

Figure 1 – Site Location Map
Figure 2 – Site Schematic
Appendix A – GPR Survey Report
Appendix B – Soil and Groundwater Laboratory Analytical Report and Chain-of-Custody

FIGURES



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Figure 1
Site Location Map
6 Old River Road
Town of Bethlehem, New York



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Figure 2
Subsurface Investigations Schematic
6 Old River Road
Town of Bethlehem, New York

APPENDIX A
GPR SURVEY REPORT



1. The subsurface utilities depicted are for informational use only. Blood Hound is not a licensed surveyor or Engineering firm. Independent verification of the provided data for any official use would be required.
2. Our subsurface utility designation was performed utilizing radio frequency (RF) and ground penetrating radar (GPR). Electromagnetic interference and subsurface soil and groundwater conditions impact the ability to identify and trace subsurface utilities.
3. Unless confirmed with test holes, any subsurface utility depths shown hereon were derived with RF or GPR methodologies and are approximate.
4. The base map imagery shown may not reflect current site conditions.
5. Designated subsurface utilities were designated using a Vivax-Metrotech vLoc3 RTK-Pro GNSS receiver, unless otherwise noted.

N

Work order# **00246970**
Work type **Locating**

Customer **Hanson Van Vleet Hydrogeologic Consultants, PLLC**
Technician(s) **Joseph Barrow**

Address **6 Old River Rd, Glenmont, NY, 12077**

Scale: **NTS**

Legend

- Com. Line
- Com. Pedestal
- Soil Boring
- Storm Line
- Storm Round CB
- Storm Square CB
- Work Limits - Black

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APPENDIX B
SOIL AND GROUNDWATER LABORATORY REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION

Thursday, February 29, 2024

Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Project ID: 6 OLD RIVER ROAD
SDG ID: GCQ09264
Sample ID#s: CQ09264 - CQ09268

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

SDG Comments

February 29, 2024

SDG I.D.: GCQ09264

SIM Analysis:
The lowest possible reporting limit under SIM conditions is 0.02 ug/L. The NY TOGS GA criteria for some PAHs is 0.002 ug/L. This level cannot be achieved.

Please be advised that the NY 375 soil criteria for chromium are based on hexavalent chromium and trivalent chromium.

CQ09264 - Client provided soil jar for volatile analysis. Phoenix prepared sample per method 5035.

CQ09265 - Client provided soil jar for volatile analysis. Phoenix prepared sample per method 5035.

CQ09266 - Client provided soil jar for volatile analysis. Phoenix prepared sample per method 5035.

CQ09267 - Client provided soil jar for volatile analysis. Phoenix prepared sample per method 5035.

Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Sample Id Cross Reference

February 29, 2024

SDG I.D.: GCQ09264

Project ID: 6 OLD RIVER ROAD

Client Id	Lab Id	Matrix
B1 8-10`	CQ09264	SOIL
B2 8-10`	CQ09265	SOIL
B3 8-10`	CQ09266	SOIL
B4 8-10`	CQ09267	SOIL
B3 WATER	CQ09268	GROUND WATER

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		02/16/24	9:50
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09264
Phoenix ID: CQ09264

Project ID: 6 OLD RIVER ROAD
Client ID: B1 8-10`

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	8.14		0.82	mg/Kg	1	02/20/24	TH	SW6010D
Barium	229		0.41	mg/Kg	1	02/20/24	TH	SW6010D
Cadmium	0.92		0.41	mg/Kg	1	02/20/24	TH	SW6010D
Chromium	31.8		0.41	mg/Kg	1	02/20/24	TH	SW6010D
Lead	18.4		0.41	mg/Kg	1	02/20/24	TH	SW6010D
Mercury	< 0.03		0.03	mg/Kg	2	02/20/24	ZT	SW7471B
Selenium	< 1.6		1.6	mg/Kg	1	02/20/24	TH	SW6010D
Silver	< 0.41		0.41	mg/Kg	1	02/20/24	TH	SW6010D
Percent Solid	79			%		02/16/24	CV	SW846-%Solid
Mercury Digestion	Completed					02/20/24	HL/HL	SW7471B
Soil Extraction for SVOA PAH	Completed					02/21/24	C/U	SW3546
Total Metals Digest	Completed					02/19/24	J/AG	SW3050B
Volatiles- STARS/CP-51								
1,2,4-Trimethylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Benzene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Ethylbenzene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Isopropylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
m&p-Xylene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Methyl t-Butyl Ether (MTBE)	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Naphthalene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
n-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
n-Propylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
o-Xylene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
p-Isopropyltoluene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
sec-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D

Project ID: 6 OLD RIVER ROAD
Client ID: B1 8-10`

Phoenix I.D.: CQ09264

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
tert-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Toluene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Total Xylenes	ND		2.5	ug/Kg	1	02/18/24	JLI	SW8260D
QA/QC Surrogates								
% 1,2-Dichlorobenzene-d4	96			%	1	02/18/24	JLI	70 - 130 %
% Bromofluorobenzene	100			%	1	02/18/24	JLI	70 - 130 %
% Dibromofluoromethane	107			%	1	02/18/24	JLI	70 - 130 %
% Toluene-d8	101			%	1	02/18/24	JLI	70 - 130 %
Semivolatiles-STARS/CP-51								
Acenaphthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Acenaphthylene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benz(a)anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(a)pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(b)fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(ghi)perylene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(k)fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Chrysene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Dibenz(a,h)anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Fluorene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Naphthalene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Phenanthrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
QA/QC Surrogates								
% 2-Fluorobiphenyl	62			%	1	02/22/24	MR	30 - 130 %
% Nitrobenzene-d5	62			%	1	02/22/24	MR	30 - 130 %
% Terphenyl-d14	53			%	1	02/22/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Please be advised that the NY 375 soil criteria for chromium are based on hexavalent chromium and trivalent chromium.

Volatile Comment:
L flag signifies that this sample was not collected in accordance with EPA method 5035. NELAC requires the laboratory to qualify the volatile soil data as biased low.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

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Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		02/16/24	10:20
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09264
Phoenix ID: CQ09265

Project ID: 6 OLD RIVER ROAD
Client ID: B2 8-10`

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	8.88	0.84	mg/Kg	1	02/20/24	TH	SW6010D
Barium	175	0.42	mg/Kg	1	02/20/24	TH	SW6010D
Cadmium	0.90	0.42	mg/Kg	1	02/20/24	TH	SW6010D
Chromium	26.9	0.42	mg/Kg	1	02/20/24	TH	SW6010D
Lead	18.9	0.42	mg/Kg	1	02/20/24	TH	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	02/20/24	ZT	SW7471B
Selenium	< 1.7	1.7	mg/Kg	1	02/20/24	TH	SW6010D
Silver	< 0.42	0.42	mg/Kg	1	02/20/24	TH	SW6010D
Percent Solid	73		%		02/16/24	CV	SW846-%Solid
Mercury Digestion	Completed				02/20/24	HL/HL	SW7471B
Soil Extraction for SVOA PAH	Completed				02/21/24	C/U	SW3546
Total Metals Digest	Completed				02/19/24	J/AG	SW3050B

Volatiles- STARS/CP-51

1,2,4-Trimethylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Benzene	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Ethylbenzene	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Isopropylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
m&p-Xylene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Methyl t-Butyl Ether (MTBE)	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Naphthalene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
n-Butylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
n-Propylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
o-Xylene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
p-Isopropyltoluene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
sec-Butylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D

Project ID: 6 OLD RIVER ROAD
Client ID: B2 8-10`

Phoenix I.D.: CQ09265

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
tert-Butylbenzene	ND	L	2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Toluene	ND	L	1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Total Xylenes	ND		2.8	ug/Kg	1	02/18/24	JLI	SW8260D
QA/QC Surrogates								
% 1,2-Dichlorobenzene-d4	97			%	1	02/18/24	JLI	70 - 130 %
% Bromofluorobenzene	102			%	1	02/18/24	JLI	70 - 130 %
% Dibromofluoromethane	106			%	1	02/18/24	JLI	70 - 130 %
% Toluene-d8	101			%	1	02/18/24	JLI	70 - 130 %
Semivolatiles-STARS/CP-51								
Acenaphthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Acenaphthylene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benz(a)anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(a)pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(b)fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(ghi)perylene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(k)fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Chrysene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Dibenz(a,h)anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Fluorene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Naphthalene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Phenanthrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
QA/QC Surrogates								
% 2-Fluorobiphenyl	66			%	1	02/22/24	MR	30 - 130 %
% Nitrobenzene-d5	68			%	1	02/22/24	MR	30 - 130 %
% Terphenyl-d14	56			%	1	02/22/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Please be advised that the NY 375 soil criteria for chromium are based on hexavalent chromium and trivalent chromium.

Volatile Comment:
L flag signifies that this sample was not collected in accordance with EPA method 5035. NELAC requires the laboratory to qualify the volatile soil data as biased low.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

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Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		02/16/24	11:00
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09264
Phoenix ID: CQ09266

Project ID: 6 OLD RIVER ROAD
Client ID: B3 8-10`

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	10.1		0.76	mg/Kg	1	02/20/24	TH	SW6010D
Barium	153		0.38	mg/Kg	1	02/20/24	TH	SW6010D
Cadmium	0.86		0.38	mg/Kg	1	02/20/24	TH	SW6010D
Chromium	31.7		0.38	mg/Kg	1	02/20/24	TH	SW6010D
Lead	19.3		0.38	mg/Kg	1	02/20/24	TH	SW6010D
Mercury	< 0.03		0.03	mg/Kg	2	02/20/24	ZT	SW7471B
Selenium	< 1.5		1.5	mg/Kg	1	02/20/24	TH	SW6010D
Silver	< 0.38		0.38	mg/Kg	1	02/20/24	TH	SW6010D
Percent Solid	79			%		02/16/24	CV	SW846-%Solid
Mercury Digestion	Completed					02/20/24	HL/HL	SW7471B
Soil Extraction for SVOA PAH	Completed					02/21/24	C/U	SW3546
Total Metals Digest	Completed					02/19/24	J/AG	SW3050B
Volatiles- STARS/CP-51								
1,2,4-Trimethylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Benzene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Ethylbenzene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Isopropylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
m&p-Xylene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Methyl t-Butyl Ether (MTBE)	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Naphthalene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
n-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
n-Propylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
o-Xylene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
p-Isopropyltoluene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
sec-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D

Project ID: 6 OLD RIVER ROAD
Client ID: B3 8-10`

Phoenix I.D.: CQ09266

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
tert-Butylbenzene	ND	L	2.5	ug/Kg	1	02/18/24	JLI	SW8260D
Toluene	ND	L	1.3	ug/Kg	1	02/18/24	JLI	SW8260D
Total Xylenes	ND		2.5	ug/Kg	1	02/18/24	JLI	SW8260D
QA/QC Surrogates								
% 1,2-Dichlorobenzene-d4	99			%	1	02/18/24	JLI	70 - 130 %
% Bromofluorobenzene	101			%	1	02/18/24	JLI	70 - 130 %
% Dibromofluoromethane	108			%	1	02/18/24	JLI	70 - 130 %
% Toluene-d8	102			%	1	02/18/24	JLI	70 - 130 %
Semivolatiles-STARS/CP-51								
Acenaphthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Acenaphthylene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benz(a)anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(a)pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(b)fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(ghi)perylene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(k)fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Chrysene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Dibenz(a,h)anthracene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Fluoranthene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Fluorene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Naphthalene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Phenanthrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
Pyrene	ND		290	ug/Kg	1	02/22/24	MR	SW8270E
QA/QC Surrogates								
% 2-Fluorobiphenyl	63			%	1	02/22/24	MR	30 - 130 %
% Nitrobenzene-d5	61			%	1	02/22/24	MR	30 - 130 %
% Terphenyl-d14	50			%	1	02/22/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Please be advised that the NY 375 soil criteria for chromium are based on hexavalent chromium and trivalent chromium.

Volatile Comment:
L flag signifies that this sample was not collected in accordance with EPA method 5035. NELAC requires the laboratory to qualify the volatile soil data as biased low.

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Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		02/16/24	11:50
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09264
Phoenix ID: CQ09267

Project ID: 6 OLD RIVER ROAD
Client ID: B4 8-10`

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	7.87	0.88	mg/Kg	1	02/20/24	TH	SW6010D
Barium	214	0.44	mg/Kg	1	02/20/24	TH	SW6010D
Cadmium	0.92	0.44	mg/Kg	1	02/20/24	TH	SW6010D
Chromium	35.4	0.44	mg/Kg	1	02/20/24	TH	SW6010D
Lead	19.1	0.44	mg/Kg	1	02/20/24	TH	SW6010D
Mercury	< 0.04	0.04	mg/Kg	2	02/20/24	ZT	SW7471B
Selenium	< 1.8	1.8	mg/Kg	1	02/20/24	TH	SW6010D
Silver	< 0.44	0.44	mg/Kg	1	02/20/24	TH	SW6010D
Percent Solid	72		%		02/16/24	CV	SW846-%Solid
Mercury Digestion	Completed				02/20/24	HL/HL	SW7471B
Soil Extraction for SVOA PAH	Completed				02/21/24	C/U	SW3546
Total Metals Digest	Completed				02/19/24	J/AG	SW3050B

Volatiles- STARS/CP-51

1,2,4-Trimethylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Benzene	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Ethylbenzene	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Isopropylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
m&p-Xylene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Methyl t-Butyl Ether (MTBE)	ND	L 1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Naphthalene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
n-Butylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
n-Propylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
o-Xylene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
p-Isopropyltoluene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D
sec-Butylbenzene	ND	L 2.8	ug/Kg	1	02/18/24	JLI	SW8260D

Project ID: 6 OLD RIVER ROAD
Client ID: B4 8-10`

Phoenix I.D.: CQ09267

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference
tert-Butylbenzene	ND	L	2.8	ug/Kg	1	02/18/24	JLI	SW8260D
Toluene	ND	L	1.4	ug/Kg	1	02/18/24	JLI	SW8260D
Total Xylenes	ND		2.8	ug/Kg	1	02/18/24	JLI	SW8260D
QA/QC Surrogates								
% 1,2-Dichlorobenzene-d4	97			%	1	02/18/24	JLI	70 - 130 %
% Bromofluorobenzene	101			%	1	02/18/24	JLI	70 - 130 %
% Dibromofluoromethane	106			%	1	02/18/24	JLI	70 - 130 %
% Toluene-d8	101			%	1	02/18/24	JLI	70 - 130 %

Semivolatiles-STARS/CP-51

Acenaphthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Acenaphthylene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benz(a)anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(a)pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(b)fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(ghi)perylene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Benzo(k)fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Chrysene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Dibenz(a,h)anthracene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Fluoranthene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Fluorene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Naphthalene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Phenanthrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
Pyrene	ND		320	ug/Kg	1	02/22/24	MR	SW8270E
QA/QC Surrogates								
% 2-Fluorobiphenyl	62			%	1	02/22/24	MR	30 - 130 %
% Nitrobenzene-d5	64			%	1	02/22/24	MR	30 - 130 %
% Terphenyl-d14	52			%	1	02/22/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Please be advised that the NY 375 soil criteria for chromium are based on hexavalent chromium and trivalent chromium.

Volatile Comment:
L flag signifies that this sample was not collected in accordance with EPA method 5035. NELAC requires the laboratory to qualify the volatile soil data as biased low.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	GROUND WATER	Collected by:		02/16/24	13:00
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09264
Phoenix ID: CQ09268

Project ID: 6 OLD RIVER ROAD
Client ID: B3 WATER

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic (Dissolved)	< 0.004	0.004	mg/L	1	02/19/24	TH	SW6010D
Barium (Dissolved)	0.098	0.002	mg/L	1	02/19/24	TH	SW6010D
Cadmium (Dissolved)	< 0.001	0.001	mg/L	1	02/19/24	TH	SW6010D
Chromium (Dissolved)	< 0.001	0.001	mg/L	1	02/19/24	TH	SW6010D
Lead (Dissolved)	< 0.002	0.002	mg/L	1	02/19/24	TH	SW6010D
Mercury (Dissolved)	< 0.0002	0.0002	mg/L	1	02/20/24	ZT	SW7470A
Selenium (Dissolved)	< 0.011	0.011	mg/L	1	02/19/24	TH	SW6010D
Silver (Dissolved)	< 0.001	0.001	mg/L	1	02/19/24	TH	SW6010D
Filtration	Completed				02/16/24	P/P	0.45um Filter
Mercury Dissolved Digestion	Completed				02/20/24	AL/HL	SW7470A
Semi-Volatile Extraction	Completed				02/16/24	Z/MQ	SW3520C
Dissolved Metals Preparation	Completed				02/16/24	P/P	SW3005A
Volatiles- Stars/CP-51							
1,2,4-Trimethylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
1,3,5-Trimethylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
Benzene	ND	0.70	ug/L	1	02/16/24	MH	SW8260D
Ethylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
Isopropylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
m&p-Xylene	ND	2.0	ug/L	1	02/16/24	MH	SW8260D
Methyl t-butyl ether (MTBE)	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
Naphthalene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
n-Butylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
n-Propylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
o-Xylene	ND	2.0	ug/L	1	02/16/24	MH	SW8260D
p-Isopropyltoluene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D
sec-Butylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
tert-Butylbenzene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D	
Toluene	ND	1.0	ug/L	1	02/16/24	MH	SW8260D	
Total Xylenes	ND	2.0	ug/L	1	02/16/24	MH	SW8260D	
QA/QC Surrogates								
% 1,2-dichlorobenzene-d4	100		%	1	02/16/24	MH	70 - 130 %	
% Bromofluorobenzene	97		%	1	02/16/24	MH	70 - 130 %	
% Dibromofluoromethane	100		%	1	02/16/24	MH	70 - 130 %	
% Toluene-d8	97		%	1	02/16/24	MH	70 - 130 %	
Semivolatiles by SIM, PAH								
2-Methylnaphthalene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Acenaphthene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Acenaphthylene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Anthracene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Benz(a)anthracene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Benzo(a)pyrene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Benzo(b)fluoranthene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Benzo(ghi)perylene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Benzo(k)fluoranthene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Chrysene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Dibenz(a,h)anthracene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Fluoranthene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Fluorene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Indeno(1,2,3-cd)pyrene	ND	0.02	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Naphthalene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Phenanthrene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
Pyrene	ND	0.47	ug/L	1	02/20/24	MR	SW8270E (SIM)	
QA/QC Surrogates								
% 2-Fluorobiphenyl	50		%	1	02/20/24	MR	30 - 130 %	
% Nitrobenzene-d5	79		%	1	02/20/24	MR	30 - 130 %	
% Terphenyl-d14	<10		%	1	02/20/24	MR	30 - 130 %	3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

3 = This parameter exceeds laboratory specified limits.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Semi-Volatile Comment:
Poor surrogate recovery was observed for one acid and/or one base surrogate. The other surrogates associated with this sample were within QA/QC criteria. No significant bias suspected.

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Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

QA/QC Report

February 29, 2024

QA/QC Data

SDG I.D.: GCQ09264

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 718839 (mg/kg), QC Sample No: CQ09150 2X (CQ09264, CQ09265, CQ09266, CQ09267)														
Mercury - Soil	BRL	0.02	<0.03	<0.03	NC	105	106	0.9	104	94.3	9.8	70 - 130	30	
Comment:														
Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.														
QA/QC Batch 718844 (mg/L), QC Sample No: CQ09330 (CQ09268)														
Mercury (Dissolved)	BRL	0.0002	<0.0002	<0.0002	NC	107			101			80 - 120	20	
Comment:														
Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.														
QA/QC Batch 718644 (mg/L), QC Sample No: CQ08434 (CQ09268)														
ICP Metals - Dissolved														
Arsenic	BRL	0.004	0.004	<0.004	NC	94.3	95.9	1.7	95.5			80 - 120	20	
Barium	BRL	0.002	0.114	0.114	0	92.6	93.0	0.4	92.2			80 - 120	20	
Cadmium	BRL	0.001	<0.001	<0.001	NC	96.0	96.0	0.0	90.8			80 - 120	20	
Chromium	BRL	0.001	<0.001	<0.001	NC	94.8	95.5	0.7	93.4			80 - 120	20	
Lead	BRL	0.002	0.003	0.002	NC	94.4	95.8	1.5	99.1			80 - 120	20	
Selenium	BRL	0.011	<0.011	<0.011	NC	83.6	84.6	1.2	84.6			80 - 120	20	
Silver	BRL	0.001	<0.001	<0.001	NC	90.4	91.7	1.4	92.7			80 - 120	20	
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														
QA/QC Batch 718772 (mg/kg), QC Sample No: CQ09162 (CQ09264, CQ09265, CQ09266, CQ09267)														
ICP Metals - Soil														
Arsenic	BRL	0.67	3.95	3.57	10.1	98.2	97.9	0.3	92.9			75 - 125	35	
Barium	BRL	0.33	543	879	47.3	108	104	3.8	>130			75 - 125	35	m,r
Cadmium	BRL	0.33	0.52	0.60	NC	99.6	96.2	3.5	90.0			75 - 125	35	
Chromium	BRL	0.33	90.8	132	37.0	101	101	0.0	123			75 - 125	35	r
Lead	BRL	0.33	20.9	23.3	10.9	102	101	1.0	101			75 - 125	35	
Selenium	BRL	1.3	1.9	<1.4	NC	91.7	92.0	0.3	86.2			75 - 125	35	
Silver	BRL	0.33	<0.35	<0.35	NC	104	102	1.9	101			75 - 125	35	
Comment:														
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.														

m = This parameter is outside laboratory MS/MSD specified recovery limits.
r = This parameter is outside laboratory RPD specified recovery limits.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

QA/QC Report

February 29, 2024

QA/QC Data

SDG I.D.: GCQ09264

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 719129 (ug/kg), QC Sample No: CQ09350 (CQ09264, CQ09265, CQ09266, CQ09267)										
Polynuclear Aromatic HC - Soil										
Acenaphthene	ND	230	69	71	2.9	68	72	5.7	30 - 130	30
Acenaphthylene	ND	230	62	63	1.6	60	64	6.5	40 - 140	30
Anthracene	ND	230	71	76	6.8	70	71	1.4	40 - 140	30
Benz(a)anthracene	ND	230	73	76	4.0	70	73	4.2	40 - 140	30
Benzo(a)pyrene	ND	230	80	85	6.1	75	81	7.7	40 - 140	30
Benzo(b)fluoranthene	ND	230	76	82	7.6	71	78	9.4	40 - 140	30
Benzo(ghi)perylene	ND	230	53	68	24.8	45	45	0.0	40 - 140	30
Benzo(k)fluoranthene	ND	230	84	85	1.2	76	83	8.8	40 - 140	30
Chrysene	ND	230	73	76	4.0	69	73	5.6	40 - 140	30
Dibenz(a,h)anthracene	ND	230	54	67	21.5	47	49	4.2	40 - 140	30
Fluoranthene	ND	230	69	73	5.6	67	68	1.5	40 - 140	30
Fluorene	ND	230	74	76	2.7	71	75	5.5	40 - 140	30
Indeno(1,2,3-cd)pyrene	ND	230	58	72	21.5	49	51	4.0	40 - 140	30
Naphthalene	ND	230	63	66	4.7	65	69	6.0	40 - 140	30
Phenanthrene	ND	230	69	74	7.0	68	70	2.9	40 - 140	30
Pyrene	ND	230	69	75	8.3	68	69	1.5	30 - 130	30
% 2-Fluorobiphenyl	45	%	65	65	0.0	63	67	6.2	30 - 130	30
% Nitrobenzene-d5	47	%	63	65	3.1	64	67	4.6	30 - 130	30
% Terphenyl-d14	39	%	56	60	6.9	54	55	1.8	30 - 130	30
QA/QC Batch 718617 (ug/L), QC Sample No: CQ08436 (CQ09268)										
Semivolatiles by SIM, PAH - Ground Water										
2-Methylnaphthalene	ND	0.50	73	74	1.4				30 - 130	20
Acenaphthene	ND	0.50	81	85	4.8				30 - 130	20
Acenaphthylene	ND	0.10	55	57	3.6				30 - 130	20
Anthracene	ND	0.10	74	77	4.0				30 - 130	20
Benz(a)anthracene	ND	0.02	75	80	6.5				30 - 130	20
Benzo(a)pyrene	ND	0.02	71	78	9.4				30 - 130	20
Benzo(b)fluoranthene	ND	0.02	73	79	7.9				30 - 130	20
Benzo(ghi)perylene	ND	0.02	60	65	8.0				30 - 130	20
Benzo(k)fluoranthene	ND	0.02	66	70	5.9				30 - 130	20
Chrysene	ND	0.02	66	71	7.3				30 - 130	20
Dibenz(a,h)anthracene	ND	0.02	74	80	7.8				30 - 130	20
Fluoranthene	ND	0.50	74	77	4.0				30 - 130	20
Fluorene	ND	0.10	65	68	4.5				30 - 130	20
Indeno(1,2,3-cd)pyrene	ND	0.02	81	89	9.4				30 - 130	20
Naphthalene	ND	0.50	66	68	3.0				30 - 130	20
Phenanthrene	ND	0.06	70	73	4.2				30 - 130	20
Pyrene	ND	0.07	73	77	5.3				30 - 130	20
% 2-Fluorobiphenyl	66	%	62	64	3.2				30 - 130	20
% Nitrobenzene-d5	64	%	77	85	9.9				30 - 130	20
% Terphenyl-d14	82	%	77	83	7.5				30 - 130	20

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

Additional 8270 criteria:20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

QA/QC Batch 718785 (ug/kg), QC Sample No: CQ09470 (CQ09264, CQ09265, CQ09266, CQ09267)

Volatiles - Soil (Low Level)

1,2,4-Trimethylbenzene	ND	1.0	116	115	0.9	94	108	13.9	70 - 130	30
1,3,5-Trimethylbenzene	ND	1.0	114	113	0.9	95	108	12.8	70 - 130	30
Benzene	ND	1.0	116	113	2.6	99	109	9.6	70 - 130	30
Ethylbenzene	ND	1.0	112	111	0.9	95	107	11.9	70 - 130	30
Isopropylbenzene	ND	1.0	116	115	0.9	99	111	11.4	70 - 130	30
m&p-Xylene	ND	2.0	110	108	1.8	92	103	11.3	70 - 130	30
Methyl t-butyl ether (MTBE)	ND	1.0	107	102	4.8	85	97	13.2	70 - 130	30
Naphthalene	ND	5.0	121	119	1.7	88	101	13.8	70 - 130	30
n-Butylbenzene	ND	1.0	118	118	0.0	94	107	12.9	70 - 130	30
n-Propylbenzene	ND	1.0	114	114	0.0	95	108	12.8	70 - 130	30
o-Xylene	ND	2.0	116	114	1.7	98	109	10.6	70 - 130	30
p-Isopropyltoluene	ND	1.0	116	116	0.0	95	109	13.7	70 - 130	30
sec-Butylbenzene	ND	1.0	116	115	0.9	97	110	12.6	70 - 130	30
tert-Butylbenzene	ND	1.0	117	116	0.9	99	112	12.3	70 - 130	30
Toluene	ND	1.0	117	114	2.6	100	110	9.5	70 - 130	30
% 1,2-dichlorobenzene-d4	97	%	104	105	1.0	104	104	0.0	70 - 130	30
% Bromofluorobenzene	101	%	102	101	1.0	102	101	1.0	70 - 130	30
% Dibromofluoromethane	106	%	105	103	1.9	105	105	0.0	70 - 130	30
% Toluene-d8	100	%	105	105	0.0	106	105	0.9	70 - 130	30

Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 718685 (ug/L), QC Sample No: CQ09633 (CQ09268)

Volatiles - Ground Water

1,2,4-Trimethylbenzene	ND	1.0	106	104	1.9				70 - 130	30
1,3,5-Trimethylbenzene	ND	1.0	108	103	4.7				70 - 130	30
Benzene	ND	0.70	100	97	3.0				70 - 130	30
Ethylbenzene	ND	1.0	102	100	2.0				70 - 130	30
Isopropylbenzene	ND	1.0	106	101	4.8				70 - 130	30
m&p-Xylene	ND	1.0	104	100	3.9				70 - 130	30
Methyl t-butyl ether (MTBE)	ND	1.0	99	97	2.0				70 - 130	30
Naphthalene	ND	1.0	113	112	0.9				70 - 130	30
n-Butylbenzene	ND	1.0	111	106	4.6				70 - 130	30
n-Propylbenzene	ND	1.0	106	102	3.8				70 - 130	30
o-Xylene	ND	1.0	107	103	3.8				70 - 130	30
p-Isopropyltoluene	ND	1.0	108	104	3.8				70 - 130	30
sec-Butylbenzene	ND	1.0	108	103	4.7				70 - 130	30
tert-Butylbenzene	ND	1.0	108	102	5.7				70 - 130	30
Toluene	ND	1.0	101	98	3.0				70 - 130	30
% 1,2-dichlorobenzene-d4	100	%	101	101	0.0				70 - 130	30
% Bromofluorobenzene	95	%	103	102	1.0				70 - 130	30
% Dibromofluoromethane	97	%	98	98	0.0				70 - 130	30
% Toluene-d8	96	%	100	99	1.0				70 - 130	30

QA/QC Data

SDG I.D.: GCQ09264

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
February 29, 2024

Thursday, February 29, 2024

Sample Criteria Exceedances Report

GCQ09264 - HANSONV

Criteria: NY: 375, 375COM, 375RRS, 375RS, CP51S

State: NY

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

February 29, 2024 SDG I.D.: GCQ09264

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

SVOA Narration

CHEM19 02/21/24-2: CQ09264, CQ09265, CQ09266, CQ09267

For 8270 full list, the DDT breakdown and pentachlorophenol & benzidine peak tailing were evaluated in the DFTPP tune and were found to be in control.
For 8270 BN list, benzidine peak tailing was evaluated in the DFTPP tune and was found to be in control.

The following Continuing Calibration compounds did not meet % deviation criteria: Benzo(ghi)perylene 31%L (30%)
The following Continuing Calibration compounds did not meet Maximum % deviation criteria: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

VOA Narration

CHEM16 02/16/24-2: CQ09268

The following Initial Calibration compounds did not meet RSD% criteria: Naphthalene 22% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

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NY Temperature Narration

February 29, 2024

SDG I.D.: GCQ09264

The samples in this delivery group were received at 1.3°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

Cooler: Yes [X] No [ ]
Coolant: IPK [X] ICE [ ] No [ ]

PHOENIX
Environmental Laboratories, Inc.

NY/NJ/PA CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: Makrina Nolan, makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.3 °C Pg of

Contact Options:
[X] Phone: 518-371-7910
[ ] Fax:
[ ] Email:

Customer: ~~90~~ HANSON VAN VLEET, PLLC
Address: 902 ROUTE 146, SUITE 2
CLIFTON PARK, NY

Project: 6 OLD RIVER RD
Report to: JAMES GIRONDA (HVV)
Invoice to: HVV
QUOTE # : —

Project P.O:

This section MUST be completed with Bottle Quantities.

Sampler's Signature: [signature] Date: 02/16/24

Client Sample Information - Identification

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	VOCs STARS	SVOCs STARS	RCRA 8 METALS	GL Amber 8 oz. [ ] w/H_3PO_4 [ ] $NAHSO_4$	Soil VOA Vials [ ] methanol [ ] H_2O	GL Soil container (4) oz	GL Soil container (2) oz	40 ml VOA Vial [ ] As is [X] HCl	GL Amber 1000ml [X] As is [ ] H_2SO_4	PL As is [X] 250ml [ ] 1500ml [ ] 1000ml	PL H_2SO_4 [ ] 250ml [ ] 1250ml [ ] 1500ml	PL NaOH 250ml	PL HNO_3 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
09264	B1 8-10'	S	02/16/24	0950		X	X	X				2	1							
09265	B2 8-10'	S	02/16/24	1020		X	X	X				2	1							
09266	B3 8-10'	S	02/16/24	1100		X	X	X				2	1							
09267	B4 8-10'	S	02/16/24	1150		X	X	X				2	1							
09268	B3 WATER	GW	02/16/24	1300		X	X	X						3	2	1				

Relinquished by:	Accepted by:	Date:	Time:
[signature]			
GT	[signature]		2:14

Comments, Special Requirements or Regulations:
METALS (GW) NEEDS TO BE LAB FILTERED
[signature] 2/16/24 1633

***MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.**

Data Format:
[ ] Phoenix Std Report [ ] EQuIS
[ ] Excel [ ] NJ Hazsite EDD
[ ] PDF [ ] NY EZ EDD (ASP)
[ ] GIS/Key [ ] Other

Turnaround:
[ ] 1 Day*
[ ] 2 Days*
[ ] 3 Days*
[ ] 4 Days*
[ ] 5 Days*
[X] Standard
* SURCHARGE APPLIES

NJ
[ ] Res. Criteria
[ ] Non-Res. Criteria
[ ] Impact to GW Soil Cleanup Criteria
[ ] Impact to GW soil screen Criteria
[ ] GW Criteria

Data Package:
[ ] NJ Reduced Deliv. *
[ ] Other
[ ] NY Enhanced (ASP B) *

NY
[ ] TOGS GW
[X] CP-51 SOIL
[X] 375SCO Unrestricted Soil
[X] 375SCO Residential Soil
[X] 375SCO Residential Restricted Soil
[X] 375SCO Commercial Soil
[ ] 375SCO Industrial Soil
[ ] Subpart 5 DW

PA
[ ] Clean Fill Limits
[ ] PA-GW
[ ] Reg Fill Limits
[ ] PA Soil Restricted
[ ] PA Soil non-restricted

State Samples Collected? NY

PEL-111 Rev 1/2023

PHOENIX
Environmental Laboratories, Inc.

Thursday, February 29, 2024

Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Project ID: **6 OLD RIVER ROAD**
SDG ID: **GCQ09263**
Sample ID#s: **CQ09263**

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Sample Id Cross Reference

February 29, 2024

SDG I.D.: GCQ09263

Project ID: 6 OLD RIVER ROAD

Client Id	Lab Id	Matrix
EXISTING WATER WELL	CQ09263	DRINKING WATER

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 29, 2024

FOR: Attn: James Gironda
Hanson VanVleet LLC
902 Route 146 – Suite # 2
Clifton Park, NY 12065

Sample Information		Custody Information		Date	Time
Matrix:	DRINKING WATER	Collected by:		02/16/24	13:30
Location Code:	HANSONV	Received by:	B	02/16/24	16:32
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCQ09263
Phoenix ID: CQ09263

Project ID: 6 OLD RIVER ROAD
Client ID: EXISTING WATER WELL

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Antimony	< 0.0004	0.0004	2	mg/L		0.006		02/21/24	CPP	E200.8
Arsenic	< 0.0005	0.0005	2	mg/L		0.01		02/21/24	CPP	E200.8
Barium	0.139	0.001	1	mg/L		2		02/22/24	TH	E200.7
Beryllium	< 0.0003	0.0003	1	mg/L		0.004		02/22/24	TH	E200.7
Calcium	117	0.10	10	mg/L				02/23/24	CPP	E200.7
Cadmium	< 0.001	0.001	1	mg/L		0.005		02/22/24	TH	E200.7
Chromium	< 0.001	0.001	1	mg/L		0.1		02/22/24	TH	E200.7
Copper	0.061	0.002	1	mg/L	1.3		1	02/23/24	CPP	E200.7
Hardness (CaCO3), calc.	355	0.1	1	mg/L				02/24/24		SM2340B-11
Iron	0.082	0.010	1	mg/L		0.3	0.3	02/22/24	TH	E200.7
Lead	0.0012	0.0010	1	mg/L	0.005			02/22/24	TH	E200.5
Magnesium	15.2	0.01	1	mg/L				02/22/24	TH	E200.7
Manganese	0.039	0.001	1	mg/L		0.3	0.05	02/22/24	TH	E200.7
Mercury	< 0.0002	0.0002	1	mg/L		0.002		02/20/24	ZT	E245.1
Nickel	< 0.001	0.001	1	mg/L				02/22/24	TH	E200.7
Selenium	< 0.001	0.001	2	mg/L		0.05		02/21/24	CPP	E200.8
Silver	< 0.001	0.001	1	mg/L		0.1	0.1	02/22/24	TH	E200.7
Sodium	109	2.0	10	mg/L				02/23/24	CPP	E200.7
Thallium	< 0.0003	0.0003	2	mg/L		0.002		02/21/24	CPP	E200.8
Zinc	0.010	0.002	1	mg/L		5	5	02/22/24	TH	E200.7
Escherichia Coli	Absent	0	1	/100 mls		0		02/16/24 19:45	DN/DT	SM9223B-04
Total Coliforms	Present	0	1	/100 mls		0		02/16/24 19:45	DN/DT	SM9223B-04
***** Total Coliforms exceeds POTABILITY level of 0 *****										
Alkalinity-CaCO3	365	20.0	1	mg/L				02/17/24	MW/KDB	SM2320B-11
Chloride	125	10.0	2	mg/L		250	250	02/17/24	BS/GD	E300.0
Color, Apparent	3	1	1	Color Units			15	02/16/24 18:48	MW	SM2120B-11
Conductivity	1040	5.00	1	umhos/cm				02/17/24	MW/KDB	SM2510B-11
Fluoride	< 0.10	0.10	1	mg/L		2.2	2	02/16/24	BS/GD	E300.0

Ver 1

Project ID: 6 OLD RIVER ROAD
Client ID: EXISTING WATER WELL

Phoenix I.D.: CQ09263

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference	
Nitrite as Nitrogen	< 0.008	0.008	2	mg/L		1		02/17/24 02:31	BS/GD	E300.0	
Nitrate as Nitrogen	0.02	0.01	1	mg/L		10		02/16/24 21:52	BS/GD	E300.0	
Odor at 60 Degrees C	< 1	1	1	T.O.N.			3	02/17/24 07:21	EG	SM2150B-97	
pH	7.73	1.00	1	pH Units			6.5-8.5	02/17/24 04:12	MW/KDB	SM4500-H B-11	1
Sulfate	32.1	5.0	1	mg/L		250	250	02/16/24	BS/GD	E300.0-2.1	
Total Cyanide (Drinking water)	< 0.005	0.005	1	mg/L		0.2		02/21/24	CL/GD	E335.4R1.0	
Tot. Diss. Solids	560	10	1	mg/L			500	02/19/24	AMM	SM2540C-15	
***** Tot. Diss. Solids exceeds Secondary Goal of 500 *****											
Turbidity	3.3	0.20	1	NTU			5	02/16/24 19:18	MW	SM2130B-11	
Extraction for 525.3	Completed							02/22/24	W/W	E525.3	
Mercury DW Digestion	Completed							02/20/24	AL/HL	E245.1	
Extraction of DW PCB	Completed							02/20/24	CV/CV	E508	
Total Metal Digestion	Completed							02/20/24	S/P/AG	E200.5/E200.7	
Total Metal Digestion (MS)	Completed							02/20/24	P/AG	E200.8	
PFAS (18)	Completed							02/22/24	***	EPA 537.1	C
PFAS (18)											
11Cl-PF3OUdS	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
9Cl-PF3ONS	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
ADONA	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
HFPO-DA	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
NEtFOSAA	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
NMeFOSAA	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluorobutanesulfonic Acid (PFBS)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluorodecanoic Acid (PFDA)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorododecanoic Acid (PFDoA)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluoroheptanoic Acid (PFHpA)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorohexanesulfonic Acid (PFHxS)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorohexanoic Acid (PFHxA)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluorononanoic Acid (PFNA)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorooctanesulfonic Acid (PFOS)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorooctanoic Acid (PFOA)	ND	1.79	1	ng/L		10		02/23/24	***	EPA 537.1	C
Perfluorotetradecanoic Acid (PFTA)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluorotridecanoic Acid (PFTrDA)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
Perfluoroundecanoic Acid (PFUnA)	ND	1.79	1	ng/L				02/23/24	***	EPA 537.1	C
QA/QC Surrogates											
% d5-NEtFOSA	71.6		1	%	NA	NA	NA	02/23/24	***	70 - 130 %	C
% d5-N-EtFOSA	71.6		1	%	NA	NA	NA	02/23/24	***	70 - 130 %	C
% M3HFPO-DA	81.5		1	%	NA	NA	NA	02/23/24	***	70 - 130 %	C
% MPFDA	78.1		1	%	NA	NA	NA	02/23/24	***	70 - 130 %	C
% MPFHxA	82.8		1	%	NA	NA	NA	02/23/24	***	70 - 130 %	C
PCB Screen											
PCB-1016 (screen)	ND	0.075	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1221 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1232 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1242 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1248 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1254 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	

Project ID: 6 OLD RIVER ROAD
Client ID: EXISTING WATER WELL

Phoenix I.D.: CQ09263

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference	
PCB-1260 (screen)	ND	0.094	1	ug/l		0.5		02/20/24	SC	E508	
PCB-1262 (screen)	ND	0.094	1	ug/l				02/20/24	SC	E508	
PCB-1268 (screen)	ND	0.094	1	ug/l				02/20/24	SC	E508	
Total PCBs (screen)	ND	0.075	1	ug/l				02/20/24	SC	E508	
QA/QC Surrogates											
%DCBP (Surrogate Rec)	81		1	%	NA	NA	NA	02/20/24	SC	30 - 150 %	
%DCBP (Surrogate Rec) (Confirmation)	73		1	%	NA	NA	NA	02/20/24	SC	30 - 150 %	
Volatiles											
1,1,1,2-Tetrachloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1,1-Trichloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1,2,2-Tetrachloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1,2-Trichloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1,2-Trichlorotrifluoroethane	ND	0.50	1	ug/L				02/19/24	HM	E524.2	1
1,1-Dichloroethane	1.2	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1-Dichloroethene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,1-Dichloropropene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2,3-Trichlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2,3-Trichloropropane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2,4-Trichlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2,4-Trimethylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2-Dichlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2-Dichloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,2-Dichloropropane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,3,5-Trimethylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,3-Dichlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,3-Dichloropropane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
1,4-Dichlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
2,2-Dichloropropane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
2-Chlorotoluene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
4-Chlorotoluene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Benzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Bromobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Bromochloromethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Bromodichloromethane	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
Bromoform	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
Bromomethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Carbon tetrachloride	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Chlorobenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Chloroethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Chloroform	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
Chloromethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
cis-1,2-Dichloroethene	14	0.50	1	ug/L		5		02/19/24	HM	E524.2	
***** cis-1,2-Dichloroethene exceeds MCL levels of 5 *****											
cis-1,3-Dichloropropene	ND	0.40	1	ug/L		5		02/19/24	HM	E524.2	
Dibromochloromethane	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
Dibromomethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Dichlorodifluoromethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Ethylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Hexachlorobutadiene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	

Ver 1

Project ID: 6 OLD RIVER ROAD
Client ID: EXISTING WATER WELL

Phoenix I.D.: CQ09263

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference	
Isopropylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
m&p-Xylene	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
Methyl t-butyl ether (MTBE)	ND	0.50	1	ug/L		10		02/19/24	HM	E524.2	
Methylene chloride	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Naphthalene	ND	0.50	1	ug/L				02/19/24	HM	E524.2	
n-Butylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
n-Propylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
o-Xylene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
p-Isopropyltoluene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
sec-Butylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Styrene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
tert-Butylbenzene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Tetrachloroethene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Toluene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Total 1,3-Dichloropropene	ND	0.40	1	ug/L				02/19/24	HM	E524.2	1
Total Trihalomethanes	ND	0.50	1	ug/L		80		02/19/24	HM	E524.2	
Total Xylenes	ND	0.50	1	ug/L		10000		02/19/24	HM	E524.2	
trans-1,2-Dichloroethene	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
trans-1,3-Dichloropropene	ND	0.40	1	ug/L		5		02/19/24	HM	E524.2	
Trichloroethene	8.7	0.50	1	ug/L		5		02/19/24	HM	E524.2	
***** Trichloroethene exceeds MCL levels of 5 *****											
Trichlorofluoromethane	ND	0.50	1	ug/L		5		02/19/24	HM	E524.2	
Vinyl chloride	1.3	0.50	1	ug/L		2		02/19/24	HM	E524.2	
QA/QC Surrogates											
% 1,2-dichlorobenzene-d4	87		1	%	NA	NA	NA	02/19/24	HM	70 - 130 %	
% Bromofluorobenzene	86		1	%	NA	NA	NA	02/19/24	HM	70 - 130 %	
Volatile Library Search	Completed							02/21/24	HM		

Semivolatile Organic

Benzo(a)pyrene	ND	0.02	1	ug/L		0.2		02/27/24	MH	E525.3	
Bis(2-ethylhexyl)adipate	ND	0.57	1	ug/L		400		02/27/24	MH	E525.3	
Bis(2-ethylhexyl)phthalate	ND	0.57	1	ug/L		6		02/27/24	MH	E525.3	
QA/QC Surrogates											
% 1,3-Dimethyl-2-nitrobenzene	86		1	%	NA	NA	NA	02/27/24	MH	70 - 130 %	
% benzo(a)pyrene-d12	83		1	%	NA	NA	NA	02/27/24	MH	70 - 130 %	
% Triphenylphosphate	107		1	%	NA	NA	NA	02/27/24	MH	70 - 130 %	

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.
C = This parameter is subcontracted.

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal LOD=Limit of Detection
MDL=Method Detection Limit1
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141 MCLs; New York State Public Health Law, Section 225 Part 5. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): (Lower of): 40 CFR Part 141.80 Lead & Copper ALs; New York State Public Health Law, Section 225 Part 5.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141 Monitoring; 40 CFR Part 143 Secondary Goals. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

*See attached

Nitrite Analysis comment:
Due to interference from a large amount of chloride in the sample, a dilution was required causing the reporting level to be elevated.

PFAS (18) (EPA 537.1), PFAS Extraction (EPA 537.1) were analyzed by NY certified lab #12058.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
February 29, 2024
Reviewed and Released by: Anil Makol, Project Manager

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT ID: EXISTING WATER WELL

Lab Name: Phoenix Environmental Labs Client: HANSONV

Lab Code: Phoenix Case No.: SAS No.: SDG No.: GCQ0926

Matrix:(soil/water) DRINKING WATER Lab Sample ID: CQ09263

Sample wt/vol: 5 (g/mL) mL Lab File ID: 0219_12.D

Level: (low/med) Date Received: 02/16/24

% Moisture: not dec. 100 Date Analyzed: 02/19/24

GC Column: RTX-VMS ID: 0.18(mm) Dilution Factor: 1

Purge Volume: 5000 (uL) Soil Aliquot Vol (uL): n.a.

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/KG) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC

J - Used when estimating a concentration for TIC where a 1:1 response is assumed or when the result indicates the presence of a compound that meets the indentification criteria, but the results is less than the quantitation limit, but greater than zero.

N - The concentration is based on the response of the nearest internal. This flag is used on the TIC form for all compounds identified

Q - For TICS, this compound was quantitated using a calibration curve. This compound is part of the instrument method, but not part of the client target list.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

QA/QC Report

February 29, 2024

QA/QC Data

SDG I.D.: GCQ09263

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 718843 (mg/L), QC Sample No: CQ08516 (CQ09263)													
Mercury	BRL	0.0002	<0.0002	<0.0002	NC	107			106			80 - 120	20
Comment:													
Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.													
QA/QC Batch 718966 (mg/L), QC Sample No: CQ09052 (CQ09263)													
ICP Metals - Aqueous													
Barium	BRL	0.0010	<0.001	<0.0010	NC	111			109			85 - 115	20
Beryllium	BRL	0.00030	<0.0003	<0.00030	NC	101			95.7			85 - 115	20
Cadmium	BRL	0.0005	<0.001	<0.0005	NC	107			102			85 - 115	20
Calcium	BRL	0.010	0.039	0.036	NC	108			103			85 - 115	20
Chromium	BRL	0.0005	<0.001	<0.0005	NC	106			102			85 - 115	20
Copper	BRL	0.0020	0.028	0.0271	3.30	109			108			85 - 115	20
Iron	BRL	0.010	<0.010	<0.010	NC	109			104			85 - 115	20
Lead	BRL	0.0010	<0.0010	<0.0010	NC	113			114			85 - 115	20
Magnesium	BRL	0.010	<0.01	<0.010	NC	111			112			85 - 115	20
Manganese	BRL	0.0010	<0.001	<0.0010	NC	106			105			85 - 115	20
Nickel	BRL	0.0010	<0.001	<0.0010	NC	107			104			85 - 115	20
Silver	BRL	0.0010	<0.001	<0.0010	NC	97.4			100			85 - 115	20
Sodium	BRL	0.20	141	167	16.9	106			NC			85 - 115	20
Zinc	BRL	0.0020	0.011	0.0114	3.60	103			99.9			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 718809 (mg/L), QC Sample No: CQ07217 2X (CQ09263)													
ICP MS Metals - Aqueous													
Antimony	BRL	0.0004	0.0023	0.0023	0	98.0			99.4			85 - 115	20
Arsenic	BRL	0.0005	0.0006	0.0013	NC	99.0			102			85 - 115	20
Selenium	BRL	0.001	<0.001	<0.001	NC	99.2			97.0			85 - 115	20
Thallium	BRL	0.0003	<0.0003	<0.0003	NC	98.6			97.6			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 70-130%.													

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NY # 11301

QA/QC Report

February 29, 2024

QA/QC Data

SDG I.D.: GCQ09263

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 718928 (mg/L), QC Sample No: CQ08516 (CQ09263)													
Total Cyanide (Drinking water)	BRL	0.005	<0.005	<0.005	NC	102			100			90 - 110	20
Weak & Dissociable Cyanide	BRL	0.005	<0.005	<0.005	NC	102			100			90 - 110	20
QA/QC Batch 718713 (mg/L), QC Sample No: CQ08516 (CQ09263)													
Tot. Diss. Solids	BRL	10	740	710	4.10	90.0						85 - 115	20
QA/QC Batch 718620 (NTU), QC Sample No: CQ08516 (CQ09263)													
Turbidity	BRL	0.20	3.3	3.3	0	103						85 - 115	20
QA/QC Batch 718663 (mg/L), QC Sample No: CQ08904 (CQ09263)													
Alkalinity-CaCO3	BRL	5.00	65	66	NC	106						85 - 115	20
QA/QC Batch 718668 (umhos/cm), QC Sample No: CQ08904 (CQ09263)													
Conductivity	BRL	5.00	280	277	1.10	97.5						85 - 115	20
Comment:													
Additional criteria matrix spike acceptance range is 75-125%.													
QA/QC Batch 718659 (pH), QC Sample No: CQ08904 (CQ09263)													
pH			7.22	7.16	0.80	97.2						85 - 115	20
QA/QC Batch 718715 (mg/L), QC Sample No: CQ08555 (CQ09263)													
Chloride	BRL	5.0	<5.0	<5.0	NC	94.9			106			90 - 110	20
Fluoride	BRL	0.10	0.44	0.48	NC	105			100			90 - 110	20
Nitrate as Nitrogen	BRL	0.05	<0.01	0.05	NC	99.6			109			90 - 110	20
Nitrite as Nitrogen	BRL	0.004	<0.004	<0.004	NC	104			101			90 - 110	20
Sulfate	BRL	5.0	17.0	16.3	NC	97.0			101			90 - 110	20
QA/QC Batch 718716 (mg/L), QC Sample No: CQ09052 (CQ09263)													
Chloride	BRL	5.0	116	116	0	96.3			101			90 - 110	20
Fluoride	BRL	0.10	<0.10	<0.10	NC	103			100			90 - 110	20
Nitrate as Nitrogen	BRL	0.05	1.06	1.06	0	95.1			98.2			90 - 110	20
Nitrite as Nitrogen	BRL	0.004	<0.004	<0.004	NC	101			98.3			90 - 110	20
Sulfate	BRL	5.0	31.2	30.7	1.60	100			104			90 - 110	20

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NY # 11301

QA/QC Report

February 29, 2024

QA/QC Data

SDG I.D.: GCQ09263

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 719938 (ng/L), QC Sample No: CQ09263 (CQ09263)											
PFOA & PFOS											
11Cl-PF3OUdS	ND	4.00	99.9	87.1		72.6			60 - 130		
9Cl-PF3ONS	ND	4.00	86.7	74.3		73.9			60 - 130		
ADONA	ND	4.00	108	95.8		91.0			60 - 130		
HFPO-DA	ND	4.00	105	78.1		90.1			60 - 130		
NEtFOSAA	ND	4.00	92.3	103		70.3			70 - 130		
NMeFOSAA	ND	4.00	98.8	84.3		71.5			70 - 130		
PFBS	ND	4.00	92.3	82.4		72.4			70 - 130		
PFDA	ND	4.00	100	84.7		83.9			70 - 130		
PFDoA	ND	4.00	95.3	81.8		69.2			70 - 130		m
PFHpA	ND	4.00	110	96.7		41.4			70 - 130		m
PFHxA	ND	4.00	106	97.9		28.7			70 - 130		m
PFHxS	ND	4.00	89.0	77.3		73.1			70 - 130		
PFNA	ND	4.00	108	90.3		85.9			70 - 130		
PFOA	ND	4.00	110	107		15.0			70 - 130		m
PFOS	ND	4.00	98.0	98.8		30.5			70 - 130		m
PFTA	ND	4.00	92.0	91.1		76.6			70 - 130		
PFTrDA	ND	4.00	98.5	88.5		73.6			70 - 130		
PFUnA	ND	4.00	97.6	79.1		71.5			70 - 130		
% d5-NEtFOSA	101	4.00	102	87.6		67.9			70 - 130		m
% M3HFPO-DA	93.3	4.00	111	86.9		88.9			70 - 130		
% MPFDA	93.8	4.00	109	86.1		89.0			70 - 130		
% MPFHxA	95.5	4.00	111	91.9		85.2			70 - 130		

Comment:

Sample CQ09263 was not used for MS, batch results provided., LCS/LCSD are spiked per method at different levels, no RPD is provided.

QA/QC Batch 719189 (ug/L), QC Sample No: CQ08500 (CQ09263)

Semivolatile Organic Compounds - Drinking Water

Benzo(a)pyrene	ND	0.02	84			86	98	13.0	70 - 130	20	
Bis(2-ethylhexyl)adipate	ND	0.60	84			84	93	10.2	70 - 130	20	
Bis(2-ethylhexyl)phthalate	ND	0.60	84			83	96	14.5	70 - 130	20	
% 1,3-Dimethyl-2-nitrobenzene	87	%	88			83	90	8.1	70 - 130	20	
% benzo(a)pyrene-d12	82	%	83			81	92	12.7	70 - 130	20	
% Triphenylphosphate	98	%	92			94	103	9.1	70 - 130	20	

Comment:

Because insufficient sample volume was received, tap water, collected and dechlorinated in sample containers, was used as the MS and MSD.
g-chlordane recovery is reported as chlordane in the LCS

QA/QC Batch 718864 (ug/l), QC Sample No: CQ07933 (CQ09263)

PCB Screen - Drinking Water

PCB-1016 (screen)	ND	0.080	104			87			40 - 140	20	
PCB-1221 (screen)	ND	0.10							40 - 140	20	

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
PCB-1232 (screen)	ND	0.10							40 - 140	20
PCB-1242 (screen)	ND	0.10							40 - 140	20
PCB-1248 (screen)	ND	0.10							40 - 140	20
PCB-1254 (screen)	ND	0.10							40 - 140	20
PCB-1260 (screen)	ND	0.10	83			67			40 - 140	20
PCB-1262 (screen)	ND	0.10							40 - 140	20
PCB-1268 (screen)	ND	0.10							40 - 140	20
%DCBP (Surrogate Rec)	79	%	84			61			30 - 150	20
%DCBP (Surrogate Rec) (Confirma	77	%	83			50			30 - 150	20
QA/QC Batch 719037 (ug/L), QC Sample No: CQ09263 (CQ09263)										
Volatiles - Drinking Water										
1,1,1,2-Tetrachloroethane	ND	0.50	104	101	2.9				70 - 130	30
1,1,1-Trichloroethane	ND	0.50	107	106	0.9				70 - 130	30
1,1,2,2-Tetrachloroethane	ND	0.50	96	96	0.0				70 - 130	30
1,1,2-Trichloroethane	ND	0.50	98	96	2.1				70 - 130	30
1,1-Dichloroethane	ND	0.50	102	100	2.0				70 - 130	30
1,1-Dichloroethene	ND	0.50	108	108	0.0				70 - 130	30
1,1-Dichloropropene	ND	0.40	110	108	1.8				70 - 130	30
1,2,3-Trichlorobenzene	ND	0.50	96	95	1.0				70 - 130	30
1,2,3-Trichloropropane	ND	0.50	92	91	1.1				70 - 130	30
1,2,4-Trichlorobenzene	ND	0.50	96	93	3.2				70 - 130	30
1,2,4-Trimethylbenzene	ND	0.50	102	100	2.0				70 - 130	30
1,2-Dichlorobenzene	ND	0.50	100	98	2.0				70 - 130	30
1,2-Dichloroethane	ND	0.50	93	93	0.0				70 - 130	30
1,2-Dichloropropane	ND	0.50	100	99	1.0				70 - 130	30
1,3,5-Trimethylbenzene	ND	0.50	102	103	1.0				70 - 130	30
1,3-Dichlorobenzene	ND	0.50	100	98	2.0				70 - 130	30
1,3-Dichloropropane	ND	0.50	95	94	1.1				70 - 130	30
1,4-Dichlorobenzene	ND	0.50	101	97	4.0				70 - 130	30
2,2-Dichloropropane	ND	0.50	110	112	1.8				70 - 130	30
2-Chlorotoluene	ND	0.50	107	103	3.8				70 - 130	30
4-Chlorotoluene	ND	0.50	100	101	1.0				70 - 130	30
Benzene	ND	0.50	104	103	1.0				70 - 130	30
Bromobenzene	ND	0.50	96	95	1.0				70 - 130	30
Bromochloromethane	ND	0.50	100	99	1.0				70 - 130	30
Bromodichloromethane	ND	0.50	98	99	1.0				70 - 130	30
Bromoform	ND	0.50	102	101	1.0				70 - 130	30
Bromomethane	ND	0.50	111	114	2.7				70 - 130	30
Carbon tetrachloride	ND	0.50	112	105	6.5				70 - 130	30
Chlorobenzene	ND	0.50	101	99	2.0				70 - 130	30
Chloroethane	ND	0.50	109	105	3.7				70 - 130	30
Chloroform	ND	0.50	97	96	1.0				70 - 130	30
Chloromethane	ND	0.50	112	110	1.8				70 - 130	30
cis-1,2-Dichloroethene	ND	0.50	104	98	5.9				70 - 130	30
cis-1,3-Dichloropropene	ND	0.40	98	96	2.1				70 - 130	30
Dibromochloromethane	ND	0.50	99	98	1.0				70 - 130	30
Dibromomethane	ND	0.50	97	97	0.0				70 - 130	30
Dichlorodifluoromethane	ND	0.50	120	119	0.8				70 - 130	30
Ethylbenzene	ND	0.50	107	104	2.8				70 - 130	30
Hexachlorobutadiene	ND	0.40	96	91	5.3				70 - 130	30
Isopropylbenzene	ND	0.50	108	106	1.9				70 - 130	30
m&p-Xylene	ND	0.50	105	105	0.0				70 - 130	30

QA/QC Data

SDG I.D.: GCQ09263

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
Methyl t-butyl ether (MTBE)	ND	0.50	93	92	1.1				70 - 130	30
Methylene chloride	ND	0.50	92	92	0.0				70 - 130	30
Naphthalene	ND	0.50	99	96	3.1				70 - 130	30
n-Butylbenzene	ND	0.50	107	104	2.8				70 - 130	30
n-Propylbenzene	ND	0.50	110	106	3.7				70 - 130	30
o-Xylene	ND	0.50	104	102	1.9				70 - 130	30
p-Isopropyltoluene	ND	0.50	107	105	1.9				70 - 130	30
sec-Butylbenzene	ND	0.50	107	104	2.8				70 - 130	30
Styrene	ND	0.50	101	100	1.0				70 - 130	30
tert-Butylbenzene	ND	0.50	107	104	2.8				70 - 130	30
Tetrachloroethene	ND	0.50	107	108	0.9				70 - 130	30
Toluene	ND	0.50	102	102	0.0				70 - 130	30
trans-1,2-Dichloroethene	ND	0.50	102	102	0.0				70 - 130	30
trans-1,3-Dichloropropene	ND	0.40	98	97	1.0				70 - 130	30
Trichloroethene	ND	0.50	105	104	1.0				70 - 130	30
Trichlorofluoromethane	ND	0.50	117	115	1.7				70 - 130	30
Trichlorotrifluoroethane	ND	0.50	114	116	1.7				70 - 130	30
Vinyl chloride	ND	0.50	115	116	0.9				70 - 130	30
% 1,2-dichlorobenzene-d4	88	%	93	91	2.2				70 - 130	30
% Bromofluorobenzene	86	%	89	88	1.1				70 - 130	30

Comment:

This batch consists of a blank, LCS and LCSD.

m = This parameter is outside laboratory MS/MSD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
February 29, 2024

Thursday, February 29, 2024

Criteria: NY: DW, DWP5

State: NY

Sample Criteria Exceedances Report

GCQ09263 - HANSONV

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CQ09263	$524WMR	Trichloroethene	EPA / 40 CFR 141 DW / 141.61 Organic MCLs	8.7	0.50	5	5	ug/L
CQ09263	$524WMR	Trichloroethene	NY / NY Part 5, Subpart 5 DW / Organics	8.7	0.50	5	5	ug/L
CQ09263	$524WMR	cis-1,2-Dichloroethene	NY / NY Part 5, Subpart 5 DW / Organics	14	0.50	5	5	ug/L
CQ09263	$524WMR	Trichloroethene	NY / NY Residential DW / Organics	8.7	0.50	5	5	ug/L
CQ09263	$524WMR	cis-1,2-Dichloroethene	NY / NY Residential DW / Organics	14	0.50	5	5	ug/L
CQ09263	NO2-DW	Nitrite as Nitrogen	EPA / 40 CFR 141 DW / 141.62 Inorganic MCLs	BRL	0.008	1	0.004	mg/L
CQ09263	T-COLIDW	Total Coliforms	EPA / 40 CFR 141 DW / 141.63 Biologicals MCLs	Present	0	0		/100 mls
CQ09263	T-COLIDW	Total Coliforms	NY / NY Part 5, Subpart 5 DW / Microbiological	Present	0	0	0	/100 mls
CQ09263	T-COLIDW	Total Coliforms	NY / NY Part 5, Subpart 5 DW / Microbiological	Present	0	0	0	/100 mls
CQ09263	T-COLIDW	Total Coliforms	NY / NY Residential DW / Microbiological	Present	0	0	0	/100 mls
CQ09263	T-COLIDW	Total Coliforms	NY / NY Residential DW / Microbiological	Present	0	0	0	/100 mls
CQ09263	TDS	Tot. Diss. Solids	EPA / 40 CFR 141 DW / 143.3 Secondary Goals	560	10	500	500	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

February 29, 2024 SDG I.D.: GCQ09263

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

NY Temperature Narration

February 29, 2024

SDG I.D.: GCQ09263

The samples in this delivery group were received at 1.3°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

Cooler: Yes ☒ No ☐
Coolant: IPK ☒ ICE ☐ No ☐

NY/NJ/PA CHAIN OF CUSTODY RECORD

Temp 1.3 °C Pg of

PHOENIX *Environmental Laboratories, Inc.*

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: Makrina Nolan, makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Contact Options:
☐ Phone:
☐ Fax:
☒ Email: JGIRONDA@HANSONVANVLEET.COM

Customer: HANSON VAN VLEET, PLLC
Address: 902 ROUTE 146, SUITE 2
CLIFTON PARK, NY

Project: 6 OLD RIVER ROAD
Report to: JAMES GIRONDA (HVV)
Invoice to: HVV
QUOTE # : —

Project P.O:

This section MUST be completed with Bottle Quantities.

Sampler's Signature: [signature] Date: 02/15/24

Client Sample - Information - Identification

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	ALK, COLOR, TURBIDITY, COND., Cl, FI	HARDNESS, NITRATE, NITRITE, ORTHO PO4, SULFATE, TDS, TOTAL CYANIDE	SHEEN (TOTAL COLIF. + E.coli)	As, Ba, Be, Cd, Ca, Cr	Cu, Fe, Pb, Mg, Mn, Hg, Ni, Se, Ag, Na, Th, Zn	* SVOCs 8270 (SIM) 5270 (508)	18 - PARAMETER PCBs 8082	GL Amber 8 oz. [ ] w/ H_3PO_4 [ ] $NaHSO_4$	Soil VOA Vials [ ] methanol [ ] H_2O	GL Soil container ( )oz	GL Soil container ( )oz	40 ml VOA Vial [ ] As is [X] HCl	GL Amber 1000ml [X] As is [ ] H_2SO_4	PL As is [2] 250ml [ ] 500ml [3] 1000ml [25 mL	PL [ ] 250ml [ ] 500ml [X] 1000ml	PL NaOH [ ] 250ml [ ] 500ml [X] 1000ml	PL HNO_3 250ml	Bacteria Bottle white: Amber: EDTA	Bacteria Bottle as is
092163	EXISTING WATER WELL	DW	02/16/24	1330		X	X	X	X	X	X	X	X					3	3	6	2	1	1	2	1

Relinquished by:	Accepted by:	Date:	Time:
[signature]			
[signature]	[signature]		224

Comments, Special Requirements or Regulations:
*SVOCs = Benzo(a)pyrene
Bis(2-ethylhexyl) adipate
Bis(2-ethylhexyl) phthalate

[signature] 2/16/24 1632

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

Data Format:
☒ Phoenix Std Report ☐ EQuIS
☐ Excel ☐ NJ Hazsite EDD
☐ PDF ☐ NY EZ EDD (ASP)
☐ GIS/Key ☐ Other

Turnaround:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☐ 4 Days*
☐ 5 Days*
☒ Standard
* SURCHARGE APPLIES

NJ
☐ Res. Criteria
☐ Non-Res. Criteria
☐ Impact to GW Soil Cleanup Criteria
☐ Impact to GW soil screen Criteria
☐ GW Criteria

Data Package:
☐ NJ Reduced Deliv. *
☐ Other
☐ NY Enhanced (ASP B) *

NY
☐ TOGS GW
☐ CP-51 SOIL
☐ 375SCO Unrestricted Soil
☐ 375SCO Residential Soil
☐ 375SCO Residential Restricted Soil
☐ 375SCO Commercial Soil
☐ 375SCO Industrial Soil
☒ Subpart 5 DW

PA
☐ Clean Fill Limits
☐ PA-GW
☐ Reg Fill Limits
☐ PA Soil Restricted
☐ PA Soil non-restricted

State Samples Collected? NY

PEL-111 Rev 1/2023

CLIENT NOTIFICATION
Positive Coliform Report

2/18/2024 2:30:33 PM

Sample Delivery Group: GCQ09263

Location Code: HANSONV

Project: 6 OLD RIVER ROAD

				T-COLI			E-COLI			F-COLI			ENTERO		
Phoenix ID	**Client Id**	**Matrix**	**Rush**	**Result**	**Units**	**Date**	**Result**	**Units**	**Date**	**Result**	**Units**	**Date**	**Result**	**Units**	**Date**
CQ09263	EXISTING WATER WELL	DW		Present	/100mls	02/16/24	Absent	/100mls	02/16/24	n.a.			n.a.		

Contact:

Date:

Comments:

Technical Report

for

Emerging Contaminants

prepared for:

Phoenix Environmental Laboratories, Inc.
P.O. Box 370, 587 East Middle Turnpike
Manchester CT, 06040
Attention: Helen Geoghegan

Report Date: 02/27/2024
Client Project ID: CQ09263
York Project (SDG) No.: 24B1099

Report Date: 02/27/2024
Client Project ID: CQ09263
York Project (SDG) No.: 24B1099

Phoenix Environmental Laboratories, Inc.
P.O. Box 370, 587 East Middle Turnpike
Manchester CT, 06040
Attention: Helen Geoghegan

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on February 20, 2024 and listed below. The project was identified as your project: **CQ09263**.

The analyses were conducted utilizing appropriate EPA methods as detailed in the data summary tables.

All samples were received in proper condition meeting the customary acceptance requirements for environmental samples except those indicated under the Sample and Analysis Qualifiers section of this report.

All analyses met the method and laboratory standard operating procedure requirements except as indicated by any data flags, the meaning of which are explained in the Sample and Data Qualifiers Relating to This Work Order section of this report and case narrative if applicable.

Please contact Client Services at 203.325.1371 with any questions regarding this report or e-mail clientservices@yorklab.com.

York Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
24B1099-01	CQ09263	Drinking Water	02/16/2024	02/20/2024

General Notes for York Project (SDG) No.: 24B1099

1. The RLs and MDLs (Reporting Limit and Method Detection Limit respectively) reported are adjusted for any dilution necessary due to the levels of target and/or non-target analytes and matrix interference. The RL(REPORTING LIMIT) is based upon the lowest standard utilized for the calibration where applicable.
2. Samples are retained for a period of thirty days after submittal of report, unless other arrangements are made.
3. York's liability for the above data is limited to the dollar value paid to York for the referenced project.
4. This report shall not be reproduced without the written approval of York Analytical Laboratories, Inc.
5. All analyses conducted met method or Laboratory SOP requirements. See the Sample and Data Qualifiers Section for further information.
6. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
7. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by York.
8. Analyses conducted at York Analytical Laboratories, Inc. Stratford, CT are indicated by NY Cert. No. 10854; those conducted at York Analytical Laboratories, Inc., Richmond Hill, NY are indicated by NY Cert. No. 12058.

Approved By: Cassie L. Mosher
Laboratory Manager

Date: 02/27/2024

Sample Information

Client Sample ID: CQ09263 **York Sample ID:** 24B1099-01

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
24B1099	CQ09263	Drinking Water	February 16, 2024 1:30 pm	02/20/2024

PFAS, EPA 537.1 List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 537.1 SPE DVB

CAS No.	Parameter	Result	Flag	Maximum Contaminant Level MCL	Units	Reported to LOQ	Reference Method	Date/Time Prep/Anal.	Analyst
375-73-5	Perfluorobutanesulfonic acid (PFBS)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
307-24-4	Perfluorohexanoic acid (PFHxA)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
375-85-9	Perfluoroheptanoic acid (PFHpA)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
335-67-1	Perfluorooctanoic acid (PFOA)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
375-95-1	Perfluorononanoic acid (PFNA)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
335-76-2	Perfluorodecanoic acid (PFDA)	ND		10	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
2058-94-8	Perfluoroundecanoic acid (PFUnA)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
307-55-1	Perfluorododecanoic acid (PFDoA)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
72629-94-8	Perfluorotridecanoic acid (PFTrDA)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
376-06-7	Perfluorotetradecanoic acid (PFTA)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
2355-31-9	N-MeFOSAA	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
2991-50-6	N-EtFOSAA	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
756426-58-1	9CL-PF3ONS	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
763051-92-9	11CL-PF3OUdS	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
13252-13-6	HFPO-DA (Gen-X)	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	
919005-14-4	ADONA	ND		-	ng/L	1.79	EPA 537.1	02/22/2024 10:20	JTG
					Certifications:		NELAC-NY12058,CTDPH-	02/23/2024 19:38	

Surrogate Recoveries	Result	Acceptance Range
Surrogate: d5-N-EtFOSAA	*71.6 %*	*70-130*
Surrogate: MPFDA	*78.1 %*	*70-130*
Surrogate: MPFHxA	*82.8 %*	*70-130*
Surrogate: M3HFPO-DA	*81.5 %*	*70-130*

Sample Information

Client Sample ID: **CQ09263** **York Sample ID:** **24B1099-01**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
24B1099	CQ09263	Drinking Water	February 16, 2024 1:30 pm	02/20/2024

Analytical Batch Summary

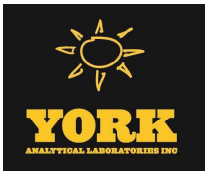
Batch ID: BB41434 **Preparation Method:** EPA 537.1 SPE DVB **Prepared By:** AM

YORK Sample ID	Client Sample ID	Preparation Date
24B1099-01	CQ09263	02/22/24
BB41434-BLK1	Blank	02/22/24
BB41434-BS1	LCS	02/22/24
BB41434-BS2	LCS	02/22/24
BB41434-DUP1	Duplicate	02/22/24
BB41434-MS1	Matrix Spike	02/22/24

PFAS Target compounds by LC/MS-MS - Quality Control Data

York Analytical Laboratories, Inc. - Stratford

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BB41434 - EPA 537.1 SPE DVB											
Blank (BB41434-BLK1)									Prepared: 02/22/2024 Analyzed: 02/23/2024		
Perfluorobutanesulfonic acid (PFBS)	ND	4.00	ng/L								
Perfluorohexanoic acid (PFHxA)	ND	4.00	"								
Perfluoroheptanoic acid (PFHpA)	ND	4.00	"								
Perfluorohexanesulfonic acid (PFHxS)	ND	4.00	"								
Perfluorooctanoic acid (PFOA)	ND	4.00	"								
Perfluorooctanesulfonic acid (PFOS)	ND	4.00	"								
Perfluorononanoic acid (PFNA)	ND	4.00	"								
Perfluorodecanoic acid (PFDA)	ND	4.00	"								
Perfluoroundecanoic acid (PFUnA)	ND	4.00	"								
Perfluorododecanoic acid (PFDoA)	ND	4.00	"								
Perfluorotridecanoic acid (PFTrDA)	ND	4.00	"								
Perfluorotetradecanoic acid (PFTA)	ND	4.00	"								
N-MeFOSAA	ND	4.00	"								
N-EtFOSAA	ND	4.00	"								
9CL-PF3ONS	ND	4.00	"								
11CL-PF3OUdS	ND	4.00	"								
HFPO-DA (Gen-X)	ND	4.00	"								
ADONA	ND	4.00	"								
Surrogate: d5-N-EtFOSAA	*324*		*"*	*320*		*101*	*70-130*				
Surrogate: MPFDA	*75.1*		*"*	*80.0*		*93.8*	*70-130*				
Surrogate: MPFHxA	*76.4*		*"*	*80.0*		*95.5*	*70-130*				
Surrogate: M3HFPO-DA	*74.6*		*"*	*80.0*		*93.3*	*70-130*				
LCS (BB41434-BS1)									Prepared: 02/22/2024 Analyzed: 02/23/2024		
Perfluorobutanesulfonic acid (PFBS)	32.7	4.00	ng/L	35.4		92.3	70-130				
Perfluorohexanoic acid (PFHxA)	42.4	4.00	"	40.0		106	70-130				
Perfluoroheptanoic acid (PFHpA)	44.1	4.00	"	40.0		110	70-130				
Perfluorohexanesulfonic acid (PFHxS)	33.8	4.00	"	38.0		89.0	70-130				
Perfluorooctanoic acid (PFOA)	43.9	4.00	"	40.0		110	70-130				
Perfluorooctanesulfonic acid (PFOS)	37.6	4.00	"	38.4		98.0	70-130				
Perfluorononanoic acid (PFNA)	43.1	4.00	"	40.0		108	70-130				
Perfluorodecanoic acid (PFDA)	40.2	4.00	"	40.0		100	70-130				
Perfluoroundecanoic acid (PFUnA)	39.0	4.00	"	40.0		97.6	70-130				
Perfluorododecanoic acid (PFDoA)	38.1	4.00	"	40.0		95.3	70-130				
Perfluorotridecanoic acid (PFTrDA)	39.4	4.00	"	40.0		98.5	70-130				
Perfluorotetradecanoic acid (PFTA)	36.8	4.00	"	40.0		92.0	70-130				
N-MeFOSAA	39.5	4.00	"	40.0		98.8	70-130				
N-EtFOSAA	36.9	4.00	"	40.0		92.3	70-130				
9CL-PF3ONS	32.4	4.00	"	37.4		86.7	60-130				
11CL-PF3OUdS	37.8	4.00	"	37.8		99.9	60-130				
HFPO-DA (Gen-X)	42.1	4.00	"	40.0		105	60-130				
ADONA	40.7	4.00	"	37.8		108	60-130				
Surrogate: d5-N-EtFOSAA	*327*		*"*	*320*		*102*	*70-130*				
Surrogate: MPFDA	*87.1*		*"*	*80.0*		*109*	*70-130*				
Surrogate: MPFHxA	*89.0*		*"*	*80.0*		*111*	*70-130*				
Surrogate: M3HFPO-DA	*88.5*		*"*	*80.0*		*111*	*70-130*				



PFAS Target compounds by LC/MS-MS - Quality Control Data

York Analytical Laboratories, Inc. - Stratford

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BB41434 - EPA 537.1 SPE DVB											
LCS (BB41434-BS2)								Prepared: 02/22/2024 Analyzed: 02/23/2024			
Perfluorobutanesulfonic acid (PFBS)	2.92	4.00	ng/L	3.54		82.4	70-130				
Perfluorohexanoic acid (PFHxA)	3.91	4.00	"	4.00		97.9	70-130				
Perfluoroheptanoic acid (PFHpA)	3.87	4.00	"	4.00		96.7	70-130				
Perfluorohexanesulfonic acid (PFHxS)	2.94	4.00	"	3.80		77.3	70-130				
Perfluorooctanoic acid (PFOA)	4.27	4.00	"	4.00		107	70-130				
Perfluorooctanesulfonic acid (PFOS)	3.79	4.00	"	3.84		98.8	70-130				
Perfluorononanoic acid (PFNA)	3.61	4.00	"	4.00		90.3	70-130				
Perfluorodecanoic acid (PFDA)	3.39	4.00	"	4.00		84.7	70-130				
Perfluoroundecanoic acid (PFUnA)	3.16	4.00	"	4.00		79.1	70-130				
Perfluorododecanoic acid (PFDoA)	3.27	4.00	"	4.00		81.8	70-130				
Perfluorotridecanoic acid (PFTrDA)	3.54	4.00	"	4.00		88.5	70-130				
Perfluorotetradecanoic acid (PFTA)	3.64	4.00	"	4.00		91.1	70-130				
N-MeFOSAA	3.37	4.00	"	4.00		84.3	70-130				
N-EtFOSAA	4.12	4.00	"	4.00		103	70-130				
9CL-PF3ONS	2.78	4.00	"	3.74		74.3	60-130				
11CL-PF3OUdS	3.29	4.00	"	3.78		87.1	60-130				
HFPO-DA (Gen-X)	3.12	4.00	"	4.00		78.1	60-130				
ADONA	3.62	4.00	"	3.78		95.8	60-130				
Surrogate: d5-N-EtFOSAA	*280*		*"*	*320*		*87.6*	*70-130*				
Surrogate: MPFDA	*68.9*		*"*	*80.0*		*86.1*	*70-130*				
Surrogate: MPFHxA	*73.5*		*"*	*80.0*		*91.9*	*70-130*				
Surrogate: M3HFPO-DA	*69.5*		*"*	*80.0*		*86.9*	*70-130*				
Duplicate (BB41434-DUP1)	*Source sample: 24B1087-01 (Duplicate)							Prepared: 02/22/2024 Analyzed: 02/23/2024			
Perfluorobutanesulfonic acid (PFBS)	2.05	2.50	ng/L		1.83				11.3	25	
Perfluorohexanoic acid (PFHxA)	2.00	2.50	"		1.50				28.8	25	Non-dir.
Perfluoroheptanoic acid (PFHpA)	ND	2.50	"		ND					25	
Perfluorohexanesulfonic acid (PFHxS)	ND	2.50	"		ND					25	
Perfluorooctanoic acid (PFOA)	4.86	2.50	"		4.06				18.0	25	
Perfluorooctanesulfonic acid (PFOS)	ND	2.50	"		ND					25	
Perfluorononanoic acid (PFNA)	ND	2.50	"		ND					25	
Perfluorodecanoic acid (PFDA)	ND	2.50	"		ND					25	
Perfluoroundecanoic acid (PFUnA)	ND	2.50	"		ND					25	
Perfluorododecanoic acid (PFDoA)	ND	2.50	"		ND					25	
Perfluorotridecanoic acid (PFTrDA)	ND	2.50	"		ND					25	
Perfluorotetradecanoic acid (PFTA)	ND	2.50	"		ND					25	
N-MeFOSAA	ND	2.50	"		ND					25	
N-EtFOSAA	ND	2.50	"		ND					25	
9CL-PF3ONS	ND	2.50	"		ND					25	
11CL-PF3OUdS	ND	2.50	"		ND					25	
HFPO-DA (Gen-X)	ND	2.50	"		ND					25	
ADONA	ND	2.50	"		ND					25	
Surrogate: d5-N-EtFOSAA	*147*		*"*	*200*		*73.4*	*70-130*				
Surrogate: MPFDA	*42.3*		*"*	*50.0*		*84.6*	*70-130*				
Surrogate: MPFHxA	*46.3*		*"*	*50.0*		*92.6*	*70-130*				
Surrogate: M3HFPO-DA	*47.1*		*"*	*50.0*		*94.2*	*70-130*				

PFAS Target compounds by LC/MS-MS - Quality Control Data

York Analytical Laboratories, Inc. - Stratford

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BB41434 - EPA 537.1 SPE DVB											
Matrix Spike (BB41434-MS1)	*Source sample: 24B1093-01 (Matrix Spike)							Prepared: 02/22/2024 Analyzed: 02/23/2024			
Perfluorobutanesulfonic acid (PFBS)	42.7	2.44	ng/L	43.2	11.4	72.4	70-130				
Perfluorohexanoic acid (PFHxA)	450	2.44	"	48.8	436	28.7	70-130	Low Bias			
Perfluoroheptanoic acid (PFHpA)	221	2.44	"	48.8	200	41.4	70-130	Low Bias			
Perfluorohexanesulfonic acid (PFHxS)	62.0	2.44	"	46.3	28.1	73.1	70-130				
Perfluorooctanoic acid (PFOA)	415	2.44	"	48.8	408	15.0	70-130	Low Bias			
Perfluorooctanesulfonic acid (PFOS)	241	2.44	"	46.8	227	30.5	70-130	Low Bias			
Perfluorononanoic acid (PFNA)	69.0	2.44	"	48.8	27.1	85.9	70-130				
Perfluorodecanoic acid (PFDA)	42.5	2.44	"	48.8	1.51	83.9	70-130				
Perfluoroundecanoic acid (PFUnA)	34.9	2.44	"	48.8	ND	71.5	70-130				
Perfluorododecanoic acid (PFDoA)	33.7	2.44	"	48.8	ND	69.2	70-130	Low Bias			
Perfluorotridecanoic acid (PFTrDA)	35.9	2.44	"	48.8	ND	73.6	70-130				
Perfluorotetradecanoic acid (PFTA)	37.4	2.44	"	48.8	ND	76.6	70-130				
N-MeFOSAA	34.9	2.44	"	48.8	ND	71.5	70-130				
N-EtFOSAA	34.3	2.44	"	48.8	ND	70.3	70-130				
9CL-PF3ONS	33.7	2.44	"	45.6	ND	73.9	70-130				
11CL-PF3OUdS	33.5	2.44	"	46.1	ND	72.6	70-130				
HFPO-DA (Gen-X)	43.9	2.44	"	48.8	ND	90.1	70-130				
ADONA	41.9	2.44	"	46.1	ND	91.0	50-130				
Surrogate: d5-N-EtFOSAA	*132*		"	*195*		*67.9*	*70-130*				
Surrogate: MPFDA	*43.4*		"	*48.8*		*89.0*	*70-130*				
Surrogate: MPFHxA	*41.6*		"	*48.8*		*85.2*	*70-130*				
Surrogate: M3HFPO-DA	*43.4*		"	*48.8*		*88.9*	*70-130*				

Sample and Data Qualifiers Relating to This Work Order

QR-02	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.
PFSL	The recovery for this PFAS surrogate was below control limits
PFLL	The recovery for this PFAS compound was below control limits

Definitions and Other Explanations

*	Analyte is not certified or the state of the samples origination does not offer certification for the Analyte.
ND	NOT DETECTED - the analyte is not detected at the Reported to level (LOQ/RL or LOD/MDL)
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
LOQ	LIMIT OF QUANTITATION - the minimum concentration of a target analyte that can be reported within a specified degree of confidence. This is the lowest point in an analyte calibration curve that has been subjected to all steps of the processing/analysis and verified to meet defined criteria. This is based upon NELAC 2009 Standards and applies to all analyses.
LOD	LIMIT OF DETECTION - a verified estimate of the minimum concentration of a substance in a given matrix that an analytical process can reliably detect. This is based upon NELAC 2009 Standards and applies to all analyses conducted under the auspices of EPA SW-846.
MDL	METHOD DETECTION LIMIT - a statistically derived estimate of the minimum amount of a substance an analytical system can reliably detect with a 99% confidence that the concentration of the substance is greater than zero. This is based upon 40 CFR Part 136 Appendix B and applies only to EPA 600 and 200 series methods.
Reported to	This indicates that the data for a particular analysis is reported to either the LOD/MDL, or the LOQ/RL. In cases where the "Reported to" is located above the LOD/MDL, any value between this and the LOQ represents an estimated value which is "J" flagged accordingly. This applies to volatile and semi-volatile target compounds only.
NR	Not reported
RPD	Relative Percent Difference
Wet	The data has been reported on an as-received (wet weight) basis
Low Bias	Low Bias flag indicates that the recovery of the flagged analyte is below the laboratory or regulatory lower control limit. The data user should take note that this analyte may be biased low but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
High Bias	High Bias flag indicates that the recovery of the flagged analyte is above the laboratory or regulatory upper control limit. The data user should take note that this analyte may be biased high but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
Non-Dir.	Non-dir. flag (Non-Directional Bias) indicates that the Relative Percent Difference (RPD) (a measure of precision) among the MS and MSD data is outside the laboratory or regulatory control limit. This alerts the data user where the MS and MSD are from site-specific samples that the RPD is high due to either non-homogeneous distribution of target analyte between the MS/MSD or indicates poor reproducibility for other reasons.
MCL	This is the Maximum Contaminant Level in ng/L (ppt) established by the NYSDOH for these compounds where an MCL is reported. Exceedences are flagged accordingly.

24B1099

Cooler: Yes [Y] No [ ]
Coolant: IPK [ ] ICE [Y] No [ ]

PHOENIX
Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1
587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
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Temp 2.4° C Pg of

Contact Options:
[ ] Fax: 860-645-0823
[ ] Phone: 800-827-5426
[ ] Email: HelenG@PhoenixLabs.com

Customer: York Analytical Laboratories
Address: 120 Research Drive
Stratford, CT
(203) 325-1371

Project #: GCQ09263
Report to: HelenG@PhoenixLabs.com / Helen Geoghegan
Invoice to: AccountsPayable@PhoenixLabs.com
Quote# :

Project P.O: GCQ09263

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature _____ Date: _____

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe
OIL=Oil **B**=Bulk **L**=Liquid

Analysis Request

Phoenix Sample ID	Sample Comment	Sample Matrix	Date Sampled	Time Sampled	PFAS (18) E537.1	250ml HDPE Plastic w/Trizma
CQ09263		DW	2/16/2024	1:30 PM	x	2

Relinquished by:	Accepted by:	Date:	Time:
		2/20/24	0755
		2/20/24	10:15
			14:30

Comments, Special Requirements or Regulations:

mple received without a Field Blank, proceed with analysis.

ase send notice as soon as possible not exceeding 24 hours of obtaining valid data, of the results of all drinking er samples that exceed any EPA or Department-established maximum contaminant level, maximum residual nfectant level or reportable concentration.

ase notify Phoenix Environmental Laboratories, Inc. immediately and prior to conducting analysis if certification ot held for the analyses requested.

Turnaround:
[ ] 1 Day
[ ] 2 Days
[ ] 3 Days
[ ] 5 Days
[ ] 10 Days
[X] Standard
[ ] Other_____

Report Type:
[X] Standard PDF
[ ] Full Data Package
[ ] NJ Reduced Deliverable
[ ] NJ Full Deliverable
[ ] NY ASP B

What State were samples collected?
NY

EDD Format:
[ ] Excel
[ ] GIS/Key
[ ] EQuIS
[ ] NJ Hazsite EDD
[ ] NY EZ EDD (ASP)
[ ] Other:_____

State Criteria:
NY: Part 5 Subpart 5 DW
NY: Residential DW

02/21/24 1019 4.8C