

**SITE CHARACTERIZATION WORK PLAN
PUTNAM VALLEY FIRE DEPARTMENT LANDFILL
SITE # 340038
PUTNAM VALLEY, NEW YORK**

WORK ASSIGNMENT NO. D009809-46

Prepared for:

**New York State Department of Environmental Conservation
Albany, New York**

Prepared by:

**Earth Environmental Engineering and Geology, P.C.
Portland, Maine**

EEEG Project Number: US0038719.7119

OCTOBER 2025

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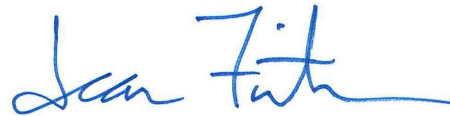
OCTOBER 2025

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
bgs	below ground surface
CAMP	Community Air Monitoring Plan
COC	contaminant of concern
CSM	conceptual site model
EEEG	Earth and Environmental Engineering and Geology, P.C.
°F	Fahrenheit
FDR	Field Data Record
ft	feet
GPS	global positioning system
HASP	Health and Safety Plan
HDR	HDR Environmental
HRP	HRP Associates, Inc.
IDW	investigation derived waste
MACTEC	MACTEC Engineering and Geology, P.C.
MCL	maximum contaminant level
ng/L	nanograms per liter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
Parsons	Parsons Corporation
PCB	polychlorinated biphenyls
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PPE	personal protective equipment
QAPP	Quality Assurance Program Plan
QC	quality control
SC	site characterization
Site	Putnam Valley Volunteer Fire Department Landfill
SOP	standard operating procedure

SVOC	semi-volatile organic compound
USEPA	United States Environmental Protection Agency
VAC	Volunteer Ambulance Corps
VFD	Volunteer Fire Department
VOC	volatile organic compound
WA	Work Assignment
WP	Work Plan

1.0 INTRODUCTION

Earth Environmental Engineering and Geology, P.C. (EEEG), under contract to the New York State Department of Environmental Conservation (NYSDEC), is submitting this Site Characterization (SC) Work Plan (WP) for the Putnam Valley Volunteer Fire Department Landfill (Site) (NYSDEC Site No. 340038) located in Putnam Valley, Putnam County, New York (Figure 1.1). This SCWP has been prepared in general accordance with the NYSDEC requirements in Work Assignment (WA) No. D009809-46, dated March 31, 2025, and with the January 30, 2020 Superfund Standby Contract between EEEG and NYSDEC.

In 2015 and 2016, nonexempt fill materials (e.g. urban fill materials and construction and demolition debris) were placed on the eastern portion of the Site for the purpose of extending the site grades over a steep slope for continued development. It is estimated that approximately 17,300 cubic yards of fill were placed. In January 2019, an Order on Consent was executed between the Putnam Valley Volunteer Fire Department (VFD) and the NYSDEC, which required soil and fill excavation and off-site disposal of a portion of the fill on the slope area, and installation of a capping system. A deed restriction was placed on the property to limit any future development of the fill area and the landfill was added to the NYSDEC list of Inactive Solid Waste Landfills sites. A site investigation was completed in 2023 that determined groundwater contamination was present in the vicinity of the Site, and therefore additional investigations were necessary to determine if the Site was the source of contamination.

As such NYSDEC issued the Work Assignment D009809-46 to conduct a Site Characterization to determine the presence or absence of contamination that has originated from waste in the landfill in the groundwater, soil, sediment, and surface water on and off site (NYSDEC, 2025).

This SCWP describes the investigation activities planned at the Site. The investigation will be performed in accordance with the pre-approved Health and Safety Plan (HASP) (MACTEC, 2020a) and Quality Assurance Program Plan (QAPP)(EEEG, 2025). A Site-Specific HASP is included as Appendix A.

This SCWP is organized into five sections as follows:

- Section 1.0 – Introduction and Site Background
- Section 2.0 –Site Physical Setting
- Section 3.0 – Conceptual Site Model
- Section 4.0 – Scope of Work
- Section 5.0 - Reporting
- Section 6.0 – References

1.1 WORK ASSIGNMENT OBJECTIVES

Based on the WA issuance and discussions with the NYSDEC Project Manager, the objectives of the SC are to:

- Evaluate the potential for the Putnam Valley VFD Landfill as a source area of contamination.
- Evaluate the presence or absence of contamination that may have originated from waste in the landfill in Site and surrounding groundwater, surface water, soil, and sediment.
- Gain a better understanding of bedrock groundwater flow in the vicinity of Site.
- Prepare and submit a SC Report for the Site.

1.2 SITE BACKGROUND

The following sub-sections describe the site location, history, and previous investigations.

1.2.1 Site Location

The Site is located across two parcels of land (Tax ID#s 72.20-1-7.11 [4 acres] and 72.20-1-7.12 [10.34 acres]) owned by the Putnam Valley Volunteer Ambulance Corps (VAC) and the Putnam Valley VFD, respectively, located at 218 Oscawana Lake Road in Putnam Valley, Putnam County, New York. The Site (i.e., the landfill) is approximately 1.5 acres in size and located in a mixed commercial and residential area, with residential property to the north, east, south, and west of the Putnam Valley VAC and Putnam Valley VFW properties (Figure 1.2).

1.2.2 Site History

Based on available information for the Site, it was undeveloped land until it was purchased by the Putnam Valley VAC and the Putnam Valley VFD in 1999. Sometime between 1999 and 2004, the Putnam Valley VAC built their station on Tax parcel 72.20-1-7.11. In 2010, the Putnam Valley VFD proposed to build a new station on the 72.20-1-7.12 tax parcel. In 2015 and 2016, fill was imported to the Site to extend the usable grade over the steep slope east of the Putnam Valley VAC and proposed Putnam Valley VFD buildings (Parson's 2023). In April of 2016, NYSDEC performed a Site visit in response to a complaint filed by the Putnam Valley VFD regarding fill material containing metal, plastic, asphalt shingles, fabric, vinyl, lumber, and ceramic tile that had been dumped along the eastern portion of their property (HRP Associates, Inc. [HRP], 2024). The fill covered an area of approximately 1.5 acres, had an estimated depth of 25 feet (ft), and was made up of silty sand and gravel. Following the Site visit, it was determined that a portion of the fill was from a site on Water Street in the Bronx, New York, but a majority of the materials came from the Metro Green Processing facility located in Mount Vernon, New York (HRP, 2024).

In 2019, NYSDEC executed an order of consent (No. R3-20181105-196) requiring the removal of impacted soil and fill for offsite removal (Parsons, 2023), which resulted in a soil removal action, regrading of the Site, and placement of a clean soil cap.

1.2.3 Previous Investigations

2017 Fill Evaluation by HDR Environmental (HDR) (document not available for review by EEEG). In 2017, a fill evaluation conducted by HDR found that the fill material at the Site had concentrations of semi-volatile organic compounds (SVOCs), metals, poly-chlorinated biphenyls (PCBs), and pesticides above the New York State soil cleanup objectives, as well as asbestos containing material. Fill material was not analyzed for per- and polyfluoroalkyl substances (PFAS) as part of this investigation (HRP, 2024).

2022 Construction Certification Report for landfill closure by HDR (document not available for review by EEEG). Based on the 2019 NYSDEC order of consent (No. R3-20181105-196), an estimated 4,240 tons of fill material was removed from the Site for offsite disposal. Following the regrading of remaining material to a maximum slope of 40%, the landfill was capped with six inches of clean soil and six inches of topsoil placed on top of an orange demarcation barrier (HDR, 2024).

Parsons Corporation, March 2023. Site-Specific Work Plan for Hydrogeologic Investigation at the Putnam Valley VFD Site. NYSDEC Region 3 – Putnam County, New York.

The objectives were to be accomplished by the installation, development, and sampling of up to four groundwater wells. Following investigation activities, groundwater analytical data was evaluated to assess whether groundwater quality had been impacted by the landfill.

Parsons Corporation (Parsons), May 2024. Field Activities Summary Report. Putnam Valley Fire Department. Region 3. Inactive Landfill Initiative. Work Assignments #D007623-33 / D009811-02

From June to September 2023, Parsons conducted a hydrogeologic investigation as part of the NYSDEC Inactive Landfill Initiative to assess the potential impacts to groundwater and downgradient receptors in the vicinity of the Putnam Valley VFD site. As part of the investigation, two monitoring wells (PAR-02 and PAR-04) were installed on site by Parsons. Two additionally planned wells, PAR-01 and PAR-03 were not installed due to drill rig access issues and the identified existing well MW-01 located in the vicinity of the proposed well PAR-01. The two newly installed wells and an existing well (MW-01) were sampled in September 2023. In addition, one surface water sample (SW-1) was collected in May 2023 near the existing storm water ponds on site.

Analytical results showed PFAS contamination in all three wells, with perfluorooctanoic acid (PFOA) concentrations ranging in concentration from 6.1 nanograms per liter (ng/L) at well PAR-04 to 19 ng/L at well MW-1, and perfluorooctanesulfonic acid (PFOS) ranging in concentrations from 2.0 ng/L at well PAR-04 to 10 ng/L at well MW-1. Several metals (calcium, magnesium, and sodium) were also detected at all three wells. Sampling also included analysis of landfill evaluation parameters (alkalinity, sulfates, total hardness, total dissolved solids, and chloride).

Parsons Residential Well Sampling, April 2024 (Report not available for review by EEEG). As a result of the identification of PFAS in Site wells, Parsons conducted sampling of 24 residential wells in the vicinity of the Site. PFAS contamination was detected in a majority of the wells sampled, with PFOA concentrations ranging from non-detect to 38 ng/L, and PFOS concentrations ranging from non-detect to 30 ng/L. The NYSDEC supplied alternative water supplies to properties where concentrations of PFAS exceeded New York State Maximum Contaminant Levels (MCLs) (HRP, 2024).

HRP Associates, Inc. August 2024. Desktop Review Summary – Statewide Inactive Landfill Initiative, Putnam Valley Volunteer Fire Department Landfill (ID #3390), 218 Oscawana Lake Rd, Putnam Valley, New York (HRP # DEC1048.P2).

In 2024, HRP conducted a desktop review as part of the NYSDEC Statewide Inactive Landfill Initiative.

HRP stated that the Site, the adjacent residential properties, the Putnam Valley Elementary School, and the Town Hall are all located within the Canopus Shear Zone. Although the topography at the Site and portions of the neighborhood to the south generally slopes down to the east, the regional fractures within this shear zone are oriented north/south with bedrock groundwater flow direction presumed to have either a north or south flow direction. Based on the physical setting of the Site, and the potential for the landfill to contain PFAS contaminated material, HRP concluded that it was possible that PFAS impacts have percolated downward from the landfill through fractures and into the bedrock aquifer.

HRP was unable to determine if the landfill material contains PFAS. It is unknown if the bedrock groundwater beneath the landfill is hydraulically connected to the residential wells south of the landfill and what the bedrock groundwater condition is directly south of the landfill. Although HRP has presumed bedrock groundwater flow in the vicinity of the Site is to the north or south following bedrock fracture orientation, actual flow direction has not been confirmed. It is unknown if private septic fields and other potential domestic wastewater discharges are a contributing source of PFAS in groundwater. It is unknown if the same assemblage of PFAS compounds is present in the landfill bedrock groundwater and the residential wells.

2.0 SITE PHYSICAL SETTING

The following sections describe the Site physical setting.

2.1 TOPOGRAPHY

The two properties where the Site is located are within the town of Putnam Valley, New York (Figure 1.1), at approximately 495 ft above mean sea level (amsl) in the central portion of the properties with elevations decreasing to the east to 365 ft amsl along the eastern boundary of the properties along the Oscawana Brook. The western portion of the properties are developed with the Putnam Valley VAC building and the partially constructed Putnam Valley VFD building, and the eastern portions are forested. The Site itself (i.e., the landfill) is located on the steep slope in the center of the properties, with elevations ranging from approximately 495 ft amsl to 430 ft amsl. There is a residential neighborhood located south of the Site with elevations ranging from 495 ft amsl in the north of the neighborhood to 415 ft amsl in the eastern portion of the neighborhood.

2.2 CLIMATE

The project area is characterized by hot and humid summers and cold winters with mean monthly temperatures ranging from 18 degrees Fahrenheit (°F) in January to 82°F in July. Average annual precipitation is 51 inches of rain and 43 inches of snow a year. This information was obtained from the website www.bestplaces.net (2025).

2.3 SURFACE WATER/STORMWATER HYDROLOGY

The Site sits on the border of the Annsville Creek and Peekskill Hollow Creek watersheds (NYSDEC, 2025), which eventually discharge into the Hudson River. Current surface topography maps of the Site do not reflect the changes made to the Site following the Order on Consent (No. R3-20181105-196) issued by NYSDEC in 2019. Based on the available information, it is assumed that surface water and storm water flows south-southeast from the Site towards Oscawana Brook. Drainage swales around the landfill itself are presumed to flow surface water to the two catchment basins constructed on the west side of the landfill.

2.4 GROUNDWATER HYDROLOGY

Based on information provided in the Desktop Review Summary (HRP, 2024), the presence of an overburden aquifer under the Site is currently unknown. Based on topography, it is anticipated that overburden groundwater, if present, would flow from the area of the landfill to the east, towards Oscawana Brook.

The depth to water in bedrock across the Putnam Valley VFD property varies from 18.7 ft below ground surface (bgs) (MW-01) located on the east side of the landfill to 52.3 ft bgs (PAR-04) on the western portion of the property. Unfortunately, accurate elevation data for the top of the casing of the monitoring wells on Site does not exist, and as such bedrock elevations and groundwater elevations and interpreted flow direction could not be determined. The north/south orientation of the regional bedrock fractures in the Canopus Shear Zone implies either a north or south bedrock groundwater flow direction (HRP, 2024).

2.5 SITE LITHOLOGY

Surficial geology at the Site is mapped as 46.2% Charlton Chatfield complex, 20.8% Paxton fine loam with a moderate to high gravel content, and a mixture of several other sandy loam soils by the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey (HRP, 2024). Boring logs from the 2024 field event conducted by Parsons suggest that native soils were often found between seven and 22 ft bgs (Parsons, 2024). Competent bedrock on Site is overlaid with six to 11 ft of weathered and/or fractured bedrock at the two wells installed during the 2024 event (PAR-02 and PAR-04).

3.0 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) is based on the review of historical data, data collected during various investigations completed at the Site between 2017 and 2024, and observations made during a Site visit completed in May 2025. This CSM is considered a dynamic model and the model presented below will be used to focus, explain, and modify data gathering activities as well as subsequent report writing activities. This CSM will be modified as more data become available and will be referenced while collecting and/or analyzing data.

3.1 SITE BACKGROUND

Based on available information for the Site, it existed as undeveloped land until it was purchased by the Putnam Valley VAC and the Putnam Valley VFD in 1999. Sometime between 1999 and 2004 the Putnam Valley VAC built a station on a section of the property. In 2010 the Putnam Valley VFD proposed to build a new station on the 72.20-1-7.12 tax parcel. In April of 2016, NYSDEC performed a Site visit, in response to a complaint filed by the Putnam Valley VFD regarding fill material containing metal, plastic, asphalt shingles, fabric, vinyl, lumber, and ceramic tile that had been dumped along the eastern portion of their property (HRP, 2024). The fill covered an area of approximately 1.5 acres, had an estimated depth of 25 ft bgs, and was made up of silty sand and gravel. Following the Site visit, it was determined that a portion of the fill was from a site on Water Street in the Bronx, New York, but a majority of the materials came from the Metro Green Processing facility located in Mount Vernon, New York (HRP, 2024).

3.2 CONTAMINANTS OF CONCERN

In 2017 a fill evaluation conducted by HRP found that fill material had concentrations of SVOCs, metals, PCBs, and pesticides above the New York State soil cleanup objectives. Although these contaminants were not identified in groundwater, limited groundwater investigations have been conducted. Fill material was not analyzed for PFAS as part of this investigation (HRP, 2024).

The principal contaminants of concern (COCs) identified in groundwater in the vicinity of the Site that exceeded applicable NYSDEC Standards identified are PFAS, particularly PFOA and PFOS. Both PFOA and PFOS have exceeded the New York State Department of Health (NYSDOH) drinking water MCLs in groundwater samples collected from monitoring wells associated with The Site and from nearby private drinking water wells.

3.3 SOURCE AREAS

Elevated concentrations of SVOCs, metals, PCBs, and pesticides were identified in landfill fill material, but it is not clear if this fill material is acting as a source of groundwater contamination, or if these contaminants are present in areas outside of the capped landfill.

Although actual source areas of PFAS contamination were not identified during previous investigations, areas of elevated PFAS were identified in groundwater in the vicinity of the Site, and it is possible that fill material within the landfill acts as a source or contributing source of this contamination.

3.4 COC POINTS OF ENTRY

Based on information collected to date at the Site, it has not been determined if the fill materials placed at the Site are the source of PFAS contamination found in the groundwater at the Site and adjacent residential properties. However, the COCs may have entered the subsurface as a result of rainwater migrating through the fill, bringing the contamination into deeper overburden and groundwater.

3.5 HYDROGEOLOGY AND CONTAMINANT DISTRIBUTION

Overburden and bedrock hydrogeology has not been evaluated at the Site. PFAS contamination is present in bedrock groundwater in the vicinity of the Site (primarily to the south of the Site); however, the source area and migration paths have not been identified. Data from the SC will be used to update the CSM and identify data gaps.

3.6 MIGRATION PATHWAYS

Potential migration pathways from the Site include groundwater and surface water. Concentrations of Site COCs in overburden and bedrock groundwater have not been fully evaluated either on or off-Site. Surface/stormwater originating at the Site and potentially impacted from direct contact with source material or by eroding contaminated soil is also considered a migration pathway from the Site. PFAS, in particular, do not readily break down in the environment and are highly mobile in water.

3.7 HUMAN EXPOSURE PATHWAYS

This human exposure assessment identifies ways in which people may be exposed to Site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as exposure.

Contaminated groundwater is a concern as a majority of the residents of Putnam Valley get their water from private wells (Town of Putnam Valley, 2018). In addition, the Site is in a groundwater supply protected zone and upgradient from six public supply wells (2,000 – 4,000 ft away) (Town of Putnam Valley, 2018).

If contamination is present in surficial soil at or in the vicinity of the Site, it could pose a direct contact risk to people accessing the Site; however, this may be limited in frequency and duration. If construction work is conducted in the vicinity of the landfill, direct contact exposure to the contaminated soil or groundwater could exist.

If contaminants are present in the Oscawanna Brook to the east of the Site, they could result in direct contact with humans or wildlife. Humans could also potentially consume wildlife that are in direct contact or consume water or vegetation from this water body.

3.8 DATA GAPS

Based on the results of past work completed (HRP, 2024) and preliminary CSM, data gaps have been identified and include:

- It is unknown if the landfill materials contain PFAS;
- It is unknown if the landfill is a source of groundwater contamination, either PFAS or other contaminants.
- The presence/extent and potential flow direction of overburden groundwater is not known;
- The groundwater flow direction in bedrock is unknown;
- The potential extent of off-site overburden and bedrock groundwater contamination has not been defined;
- It is unknown if the bedrock groundwater beneath the landfill is hydraulically connected to the residential wells south of the Site and if the wells have the same assemblage of PFAS compounds (i.e., if the source is the same);
- It is unknown if the private septic fields and other potential domestic wastewater discharges are a contributing source of the identified PFAS contamination in groundwater; and,
- It is not known if site related contamination is migrating to Oscawana Brook.

4.0 SCOPE OF WORK

This SCWP has been developed for the purpose of addressing WA objectives (Section 1.1) and current data gaps (Section 3.8). Collected data will be used to prepare an SC Report.

The components of the SC include the following items:

- Prepare a of a Site-specific HASP;
- Prepare a Site-specific SCWP;
- Procuring and scheduling subcontractors;
- Coordinating Access with NYSDEC and abutters;
- Marking proposed boring and monitoring well locations and performing utility clearance by contacting UDig-NY and a private utility Clearance Subcontractor;
- Perform utility clearance and evaluate the location of utilities at the proposed drilling locations;
- Complete four direct-push borings to approximately 30 ft bgs (or refusal)
 - Collect surface and subsurface soil samples from four locations (plus quality control [QC]) at depths of 0-2 inches below vegetation, 2-12 inches bgs and at depth (refusal or one foot above the water table) for analysis of PFAS, plus analysis of volatile organic compounds (VOCs), SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane at three locations;
- Install and develop three overburden groundwater monitoring wells;
- Conduct step-drawdown tests on the three newly installed overburden wells;
- Add transducers to two existing on-site bedrock wells;
- Complete three bedrock borings to approximately 90 ft bgs;
 - Collect surface and subsurface soil samples from each boring (plus QC) at depths of 0-2 inches below vegetation, 2-12 inches bgs and at depth (one foot above the water table or above top of rock if overburden is dry) for analysis of PFAS, plus analysis of VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane at two locations;
- Install and develop three bedrock groundwater monitoring wells;
- Install transducer into one of the three new bedrock wells;
- Conduct slug tests at newly installed bedrock wells and at the three existing wells (MW-1, PAR-02, and PAR-04);
- Collect water levels and groundwater samples from each newly installed well and three existing wells (MW-1, PAR-02, and PAR-04) (plus QC) for analysis of PFAS, plus analysis of VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane at two locations;

- Collect five surface water samples (plus QC), three from Oscawanna Brook and two from the two stormwater ponds on Site (one each) for analysis of PFAS, VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane;
- Collect five sediment samples co-located with the five surface water samples for the analysis of PFAS, VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane;
- Complete a horizontal and elevation survey of the six new monitoring well locations and three existing monitoring well locations;
- Complete a horizontal survey of the surface water and sediment sampling locations, and other relevant locations (as determined in the field) using a geographic positioning system (GPS);
- Investigation derived waste (IDW) management and disposal;
- Data validation and EQUIS database deliverable; and
- Prepare and submit SC Report for the Site.

4.1 GENERAL FIELD OPERATIONS

The objective of the SC is to evaluate the presence or absence of contamination that has originated from waste in the landfill in on and off-site groundwater, soil, sediment, and surface water. One of the focuses is to evaluate if the landfill is the source, or a contributing source to the identified bedrock PFAS contamination. This WA also includes an SC Report, Technical Support, and Decision Document Support.

Companion documents to this SCWP that will govern the execution of the field exploration activities include EEEG's Program HASP (MACTEC, 2020a) and QAPP (EEEG, 2025). In addition to these program documents, the Site-specific HASP (Appendix A) provides details related to health and safety for on-Site activities. Field data records (FDRs) will be completed to document sample collection. Standard Operating Procedures (SOPs) for the field work and accompanying FDR forms are included in Appendix B.

EEEG has selected the following sub-contractors to assist in the SC.

- M&P Engineering and Land Surveying from Skaneateles, New York, will perform horizontal and vertical surveying of existing and newly installed monitoring wells,
- Pace analytical (multiple locations), under contract to the NYSDEC, will perform laboratory analysis,
- Cascade from Mineola, New York, will perform overburden and bedrock borings and well installation via direct push and rotosonic drilling technology,
- GPRS, Inc., will perform underground utility clearance of proposed boring locations, and,
- IDW waste disposal contractor will be determined once waste has been generated.

4.1.1 Health and Safety

The Site-specific HASP is provided as Appendix A to this document. Based on available Site information, fieldwork will be conducted in modified Level D personal protective equipment (PPE). Specific investigation activities and required level of personal protection are set forth in the Site-specific HASP. Criteria for upgrading or downgrading the specified level of protection are also provided in the Site-specific HASP. Additional health and safety requirements are set forth in the Program HASP (MACTEC, 2020a). Should Site conditions pose a threat to those present on-Site, and/or should Site conditions warrant an upgrade from modified Level D, as defined by the HASP, work will stop, and the situation will be reevaluated by NYSDEC and EEEG.

4.1.2 Property Access

To evaluate the potential for off-site migration of contaminants, installation of monitoring wells and collection of water or soil samples at on-Site and offsite locations is planned. Prior to the start of work, the NYSDEC Project Manager will coordinate property access with landowners and will have approval of property access in writing before field activities begin.

4.1.3 Utility Clearance

Prior to the start of any ground intrusive activity, including direct push and bedrock drilling, a utility clearing company (GPRS, Inc.) will be subcontracted to clear proposed areas. If a proposed drilling location is affected by a suspected underground utility, the location will be moved to a nearby location that is cleared by GPRS.

4.1.4 Mobilization

EEEG will begin field efforts upon receipt of approval of the SCWP by the NYSDEC project manager. Due to the quantity of proposed field activities, multiple mobilizations will be required. EEEG will coordinate mobilizations to accomplish the maximum amount of work in the most efficient means possible. Mobilization will include obtaining utility clearances and acquisition of the following:

- transportation to and from the Site;
- health and safety equipment;
- sampling equipment and field supplies; and
- decontamination supplies and equipment.

Prior to the commencement of any field activities, a kick-off meeting will be held prior to mobilization, and upon arrival on-Site with EEEG and subcontractor personnel to familiarize on-Site workers with the Site's history, health and safety requirements, sampling procedures, decontamination efforts, and IDW handling.

4.1.5 Decontamination

Sampling methods and equipment for this field program have been chosen to minimize decontamination requirements, reducing the potential for cross contamination. Disposable sampling equipment will be used as much as practical to minimize decontamination time and water disposal. Non-disposable sampling equipment will be decontaminated before and after collection of each sample. Decontamination methods and materials are described in detail SOPs 20 and 21.

Non-disposable sampling equipment will be decontaminated by washing the sampling equipment with potable water and Liquinox[®], rinsing with potable water, rinsing with deionized water, and then allowing the equipment to air dry, or steam cleaning the equipment and then allowing the equipment to air dry. Direct-push and bedrock drilling equipment (i.e., drill rods and casing) will be decontaminated by steam cleaning with potable water or with a Liquinox[®] and potable water solution prior to each boring and before leaving the Site on a temporary decontamination pad constructed at the Site. Decontamination water will be collected, containerized, and stored on pallets in an agreed upon area at the Site (i.e. asphalt parking area to the west of the landfill) in labeled containers awaiting treatment and/or proper disposal based on IDW characterization sampling results.

4.1.6 Laboratory Analysis

Samples submitted to the Pace Analytical laboratory will be analyzed using the methods outlined below. The laboratory will provide NYSDEC Category B deliverables.

For soil and water (surface/subsurface soil, sediment, surface water, and groundwater) samples, the following methods will be used:

- PFAS by EPA Method 1633
- VOCs by EPA Method 8260
- SVOCs by EPA Method 8270
- Pesticides by EPA Method 8081
- Herbicides by EPA Method 8051
- PCBs by EPA Method 8082
- Metals by EPA Method 6010
- 1,4-dioxane by EPA Method 8270 SIM

Sample nomenclature will generally follow that described in the QAPP (EEEG, 2025 Individual media will be identified as follows:

- Groundwater: Site Number - Well ID (MW####) – Depth (###)

- Surface/subsurface Soil: Site Number - Location ID (DP#### or SB####) – Depth Interval (###)
- Surface Water: Site Number - Location ID (SW####) – Depth Interval (###)
- Sediment: Site Number - Location ID (SD####) – Depth Interval (###)
- QA/QC: Blank Type (FB) – Number in sequence - Date (MMDDYY)

4.1.7 Community Air Monitoring Plan (CAMP)

Purpose

The purpose of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases as a result of remedial work activities performed at the Site. Site-specific procedures described below are consistent with the NYSDOH generic CAMP (NYSDEC, 2010). Although most of the proposed borings are located away from residential dwellings, there are proposed bedrock well locations within approximately 100 ft of residential dwellings.

Particulate Air Monitoring

Particulate monitoring will be conducted continuously during ground intrusive activities (e.g., installation of soil/bedrock borings and monitoring wells). Dust/particulate monitoring will be conducted in the vicinity of the drilling activities. In addition, particulates will be continuously monitored 50 ft downwind of the drilling location (or 50 ft from the drilling location towards the nearest occupied building). Dust monitoring may be suspended during periods of precipitation.

Particulate air monitoring will be conducted with a TSI DustTrak II (or a similar device). This instrument is equipped with an audible alarm (indication of exceedance) and is capable of measuring particulate matter less than 10 micrometers in size (PM-10). The device will continually record emissions (calculating 15-minute running average concentrations) generated during field activities. The dust monitoring device will be checked periodically throughout each day of intrusive activities to assess emissions and the need for corrective action.

Weather conditions, including the prevailing wind direction, will be observed and recorded for each day of Site activities. As work and weather conditions change throughout the day, the locations where the dust monitoring devices are set up may be adjusted accordingly.

Particulate monitoring response and action levels include:

- If the PM-10 particulate level is 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) greater than background 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

the PM-10 particulate levels do not exceed $150 \mu\text{g}/\text{m}^3$ above background level and provided that no visible dust is migrating from the work area.

- If after implementation of dust suppression techniques, the PM-10 particulate levels are greater than $150 \mu\text{g}/\text{m}^3$ above background, work will 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 PM-10 particulate concentration to within $150 \mu\text{g}/\text{m}^3$ of the background level and in preventing visible dust migration.

VOC Air Monitoring

VOC air monitoring will be conducted in conjunction with the dust monitoring program. VOC air monitoring will be conducted using a RAE Systems MiniRAE 3000 VOC instrument (or a similar photoionization detection device). This will provide real-time recordable air monitoring data.

VOC monitoring will be conducted for ground intrusive (continuous monitoring) and non-intrusive activities (periodic monitoring).

VOCs will be continuously monitored in the vicinity of the drilling operation. Upwind/background concentrations will be measured before field activities commence and periodically throughout the day to confirm background conditions. In addition, VOCs will be continuously monitored 50 ft downwind of the drilling location (or 50 ft from the drilling location towards the nearest occupied building). The drilling area VOC monitoring device and downwind VOC monitoring device will be checked periodically throughout the day to assess emissions and the need for corrective action.

VOC monitoring response and action levels include:

- If the ambient air concentration of total organic vapors at the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will 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.
- If total organic vapor levels at the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. Work activities can resume provided the total organic vapor level 200 ft downwind of the work area or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 ft, 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, activities will be shutdown.

Weather conditions, including the prevailing wind direction, will be observed and recorded for each day of Site activities. As work and weather conditions change throughout the day, the locations of the VOC monitoring devices may be adjusted accordingly.

4.2 SITE CHARACTERIZATION

The field work is anticipated to be conducted as described in the following subsections. The field work will be conducted in accordance with the specifications presented in the QAPP (EEEG, 2025), a stand-alone document. Relevant SOPs from the QAPP are also included in Attachment B. Sample locations are presented on Figure 1.2 and sample IDs and proposed analysis are presented in Table 4.1.

4.2.1 Drilling Activities

Overburden Drilling

Overburden borings are being completed to evaluate soil around the landfill and for the installation of overburden monitoring wells. Based on drilling efforts and soil sampling conducted in 2023, four soil borings will be advanced using a track mounted direct push rig at pre-selected locations. Borings will be drilled to bedrock refusal (assumed to be at a depth of less than 30 ft bgs; although apparent bedrock outcrop was also observed during the Site walk) using a three inch inside diameter core sampler for the collection of soil samples and installation of permanent monitoring wells. Soil samples will be collected at up to three depths at each location using laboratory supplied containers:

- 0-2 inches below vegetation;
- 2-12 inches bgs; and,
- One foot above the water table or above top of rock if overburden is dry.

Samples will be analyzed for PFAS at all locations and for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane at three locations.

Bedrock Drilling

Bedrock borings are being completed to evaluate soil in the vicinity of the Site and for the installation of bedrock monitoring wells. Based on the drilling and groundwater sampling conducted in 2023, three bedrock borings will be advanced using a track mounted drilling rig capable of rotosonic and air hammering at pre-selected off-site locations. Drilling will be completed using rotosonic drilling through the overburden, and

based on area bedrock, it is anticipated that drill techniques will switch to air hammer to enable completion through the hard bedrock. Borings will be drilled until water bearing fractures are encountered with sufficient flow for sampling (anticipated to be to a depth of approximately 90 ft bgs).

Soil samples will be collected from the overburden at up to three depths at each location using laboratory supplied containers:

- 0-2 inches below vegetation;
- 2-12 inches bgs; and,
- One foot above the water table or above top of rock if overburden is dry.

Samples will be analyzed for PFAS at all locations and for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals, and 1,4-dioxane at two locations.

Prior to the drilling of the three new bedrock wells, transducers will be installed in the two existing on-site bedrock wells to monitor potential changes in water levels. In addition, upon completion of the first bedrock well a third transducer will be installed in the first new bedrock well. The transducers will monitor water levels in bedrock wells during drilling of new wells to evaluate potential effects of drilling across wells. The drilling field crew will take detailed observation notes of bedrock drilling depth and time (at a minimum, the time will be noted for each five ft of depth drilled). This data will be compared to the transducer data, so that observed changes in water level, presumably from air pressure from the air hammer, can be correlated with depth in the well being drilled. A change in water level observed with the transducer is anticipated to represent a fracture connection between that well and the well being drilled. The time correlation will allow for an approximation of the depth of the connecting fracture in the well being drilled. Transducers will remain in the wells for at least 24 hours after the drilling is complete to allow evaluation of background conditions.

4.2.2 Monitoring Well Installation

Bedrock groundwater samples collected from Site monitoring wells in 2023 and private supply wells in 2024 identified PFAS contamination in area bedrock groundwater. To evaluate: 1) if the Site is a potential source of this contamination, 2) if the Site is a potential source of other groundwater contamination not previously evaluated, and 3) the potential migration pathways for contaminants to move off site, the following monitoring wells are proposed for the Site Characterization activities.

- Three (3) overburden monitoring wells
- Three (3) bedrock monitoring wells

Proposed overburden groundwater monitoring wells are designed to determine the presence or absence of the COCs in overburden groundwater to the east, south, and north of the Site and evaluate vertical groundwater gradients within overburden. Monitoring wells will generally consist of 10 ft of 1-inch PVC screens, with risers extending approximately two ft above ground surface. Number zero sand will be placed around the bottom of the well screen to approximately two ft above the top of the screen, with a two-foot bentonite seal above the sand; remaining backfill to ground surface will be based on depth (i.e., bentonite, grout, or sand).. Actual screen lengths and backfill will be based on depth to bedrock and observations made while drilling at each location.

Overburden wells will be completed at the surface with four-inch steel casing with locking cap.

Proposed bedrock groundwater monitoring wells are designed to evaluate the presence or absence of contaminants of concern in bedrock to the north and south of the Site (i.e., along the potential fracture zone below the Site) and if the site is potentially the source of the identified bedrock groundwater PFAS contamination. Wells will also be used to evaluate groundwater gradients and potential bedrock groundwater flow direction. Monitoring wells will consist of 10 to 20- ft of 2-inch PVC screens and PVC risers; screen depth and length will depend on observations made while drilling, including rock chip observations for changes/staining, driller notes of water loss or drill bit drop, and transducer data. Number zero sand will be placed around the bottom of the well screen to approximately two ft above the top of the screen. A two-foot bentonite seal will placed above the screen, and a bentonite grout will be used to fill and stabilize the boring to ground surface. The wells will be completed with either a two-foot steel casing or flush mount road box, depending on location (the homeowner association associated with the off-site locations requested flush mount road box).

4.2.3 Monitoring Well Development

Upon completion of well installation, the newly installed monitoring wells will be developed using pump and surge techniques as described in SOP S23. Transducers will be removed from wells prior to well development. Purge water generated during well development will be containerized in USDOT approved 55-gallon drums and disposed of per NYSDEC guidance based on sampling results.

4.2.4 Water Level Synoptic Round

Upon completion of well development, onsite personnel will conduct a synoptic water level round. A water level will be collected from the top of the riser at each of the three existing monitoring wells on Site and from the six newly installed monitoring wells on and offsite to further evaluate groundwater elevations and flow directions. A synoptic round of water levels will also be collected prior to sampling the monitoring wells.

4.2.5 Groundwater Sampling

Groundwater samples will be collected from the six newly installed wells, and three existing on-site wells using low flow procedures described in SOP S3. To evaluate the presence or absence of Site COCs in overburden and bedrock groundwater, samples will be analyzed for PFAS at all locations, and for VOCs, SVOCs, pesticides, herbicides, PCBs, Metals, and 1,4-dioxane at two locations (two overburden and two bedrock).

Purge water generated during groundwater sampling will be containerized in USDOT approved 55-gallon drums and disposed of per NYSDEC guidance based on sampling results.

4.2.6 Surface Water and Sediment Sampling

Co-located surface water and sediment samples will be collected from up to five locations from three separate bodies of water (Oscawana Brook [three samples] and two stormwater ponds on Site [one each]) in proximity to the Site. Samples from Oscawana Brook are being collected to evaluate if potentially contaminated groundwater is discharging to the brook and locations are proposed to be representative of potential discharge locations, and upstream and downstream of the potential discharge location. Samples will be collected starting from the downstream location first, as well as surface water collection prior to sediment collection following the procedure outlined in SOPs S7 and S10 (respectively). Samples will be analyzed for PFAS, VOCs, SVOCs, pesticides, herbicides, PCBs, Metals, and 1,4-dioxane to further evaluate the presence or absence of potential Site COCs in surface water bodies.

4.2.7 Slug Tests

Slug testing will be completed on the three newly installed bedrock wells and three existing wells to evaluate aquifer transmissivity and hydraulic conductivity. A slug test will be conducted by displacing the water level in a monitoring well by rapidly inserting or removing a known-volume “slug” (weighted object) and then measuring the water level’s recovery to its initial, static level over time using a data logger or probe.

The initial water level in the well will be monitored by deploying a data logger. Once the water level has stabilized, a “falling-head test” will be conducted by adding a slug to the well. The data logger will record the water level changes over time as the water level recovers to its original state. Once the water level has stabilized, a “rising-head” test will be conducted by removing the slug. The data logger will record the water level changes over time as the water level recovers to its original state. If it is determined that the well screen crosses the water table, then two rising-head tests will be conducted and no falling-head test. The data will be uploaded and used to calculate the aquifer’s hydraulic properties.

4.2.8 Step-Drawdown Tests

Step-drawdown testing will be conducted on the three newly installed overburden wells (and other monitoring wells if determined to be smaller than two-inch diameter) to evaluate aquifer transmissivity and hydraulic conductivity. A step-drawdown test will be conducted by progressively increasing the pumping rate in discrete, constant rate steps while measuring water levels in the well. After a static water level has been established, pumping will begin at a low rate (one that induces some well drawdown) for a set duration (e.g., 30 minutes) until the water stabilizes. Then, the pumping rate will be increased to the next higher step to induce further drawdown, with the process being repeated for at least three steps, or until the water level fails to stabilize. Drawdown and flow rate data will be collected throughout the test so that well efficiency and aquifer properties can be determined.

4.2.9 Survey

Newly installed wells, existing wells on-site, and soil boring locations will be surveyed by M&P Land Surveying from Skaneateles, New York. Horizontal locations will be tied to the NYS Plane Coordinate System using North American Datum of 1983 to an accuracy of 0.1 foot. Vertical elevations of groundwater wells will be tied to the North American Vertical Datum of 1988 and measured to an accuracy of 0.01 ft. Horizontal locations and vertical elevation data will be presented to EEEG in a database to be used with geographic information systems software. Well and soil boring locations will be presented on an aerial photograph of the Site and surrounding area.

The horizontal location data of the surface water and sediment samples will be collected by EEEG personnel using a GPS with a sub-meter accuracy.

4.3 INVESTIGATION DERIVED WASTE

IDW generated during the Site Characterization field activities is expected to include groundwater, soil, and PPE, and will be handled as follows:

- During well development and groundwater sampling activities, groundwater will be containerized in 55-gallon steel drums and labeled accordingly. At the completion of field activities, the water will be sampled for waste characterization and disposal parameters and disposed of by a licensed waste transportation and disposal sub-contractor.
- Soil cuttings generated during drilling activities will be containerized in 55-gallon drums and labeled accordingly. At the completion of field activities, the soil will be sampled for waste characterization and disposal parameters and disposed of by a licensed waste transportation and disposal sub-contractor.
- Used PPE will be bagged and disposed of as municipal solid waste.

5.0 REPORTING

Following completion of the SC field activities and receipt of analytical data, EEG will review analytical data, update the CSM, and prepare a SC Report to summarize the sampling activities and results. The SC Report will include:

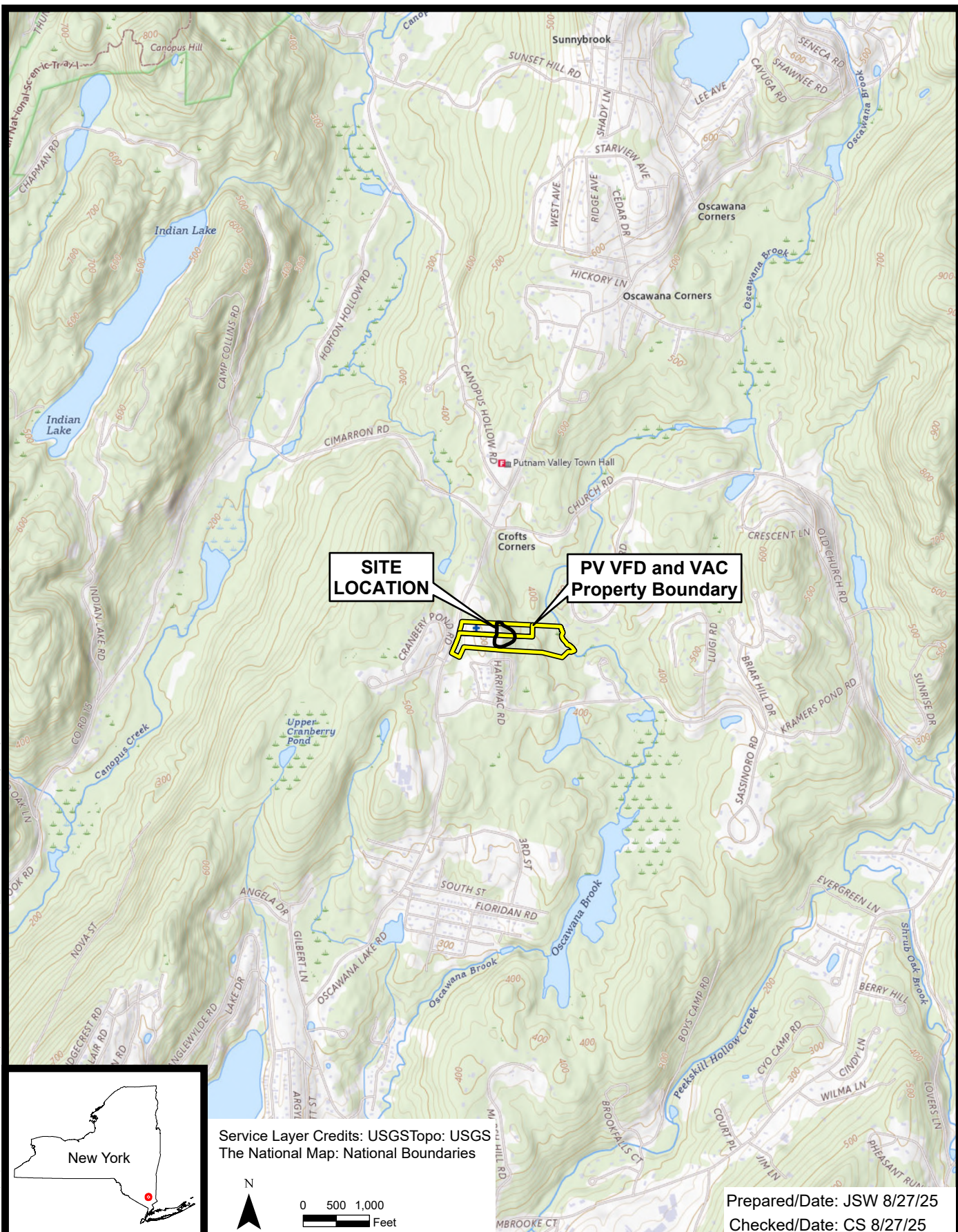
- Evaluating and validating laboratory analytical data and preparing data usability summary reports.
- Presenting a summary of field activities conducted.
- Presenting FDRs (e.g. boring logs, groundwater sampling logs, etc) in an appendix.
- Presenting a figure showing locations sampled during the field activities, as well as figures showing extent of soil, groundwater, surface water, and sediment contamination if present.
- Presenting data in tabular format compared to New York State standards, criteria, and guidance values.
- Providing a summary of findings, conceptual site model, conclusions and recommendations following DER-10 guidance.
- Submitting a draft SC Report to the NYSDEC for a review and comments. (one round of review and comments on the draft Report are anticipated).
- Uploading the final SC Report electronically to the NYSDEC as a PDF.
- Submitting Laboratory and location information to the NYSDEC in the NYSDEC EQuIS electronic data deliverable format.

6.0 REFERENCES

- Best Places, 2025. [Putnam Valley, NY Climate. www.bestplaces.net/climate/city/ny/putnam_valley.](https://www.bestplaces.net/climate/city/ny/putnam_valley)
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- MACTEC, 2020a. *Program Health and Safety Plan*. Prepared for New York State Department of Environmental Conservation, Albany, New York. March 2020.
- EEEG, 2025. *Program Quality Assurance Program Plan, Revision 2*. Prepared for the New York State Department of Environmental Conservation, Albany, New York. August 2025.
- New York State Department of Environmental Conservation. *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC’s Part 375 Remedial Programs*. January 17, 2020
- New York State Department of Environmental Conservation. *DER-10 Technical Guidance for Site Investigation and Remediation, DEC Program Policy*. May 2010.
- Parsons, 2023. *Site-Specific Work Plan for Hydrogeologic Investigation at the Putnam Valley Volunteer Fire Department Region 3*. Prepared for New York State Department of Environmental Conservation, Albany New York, March 2023.
- Parsons, 2024. *Field Activities Summary Report Putnam Valley Volunteer Fire Department Region 3*. Prepared for New York State Department of Environmental Conservation, Albany New York, May 2024.
- Putnam Valley Committee for the Conservation of the Environment (Putnam Valley CCE), 2018. *Town of Putnam Valley Natural Resources Inventory*.

FIGURES

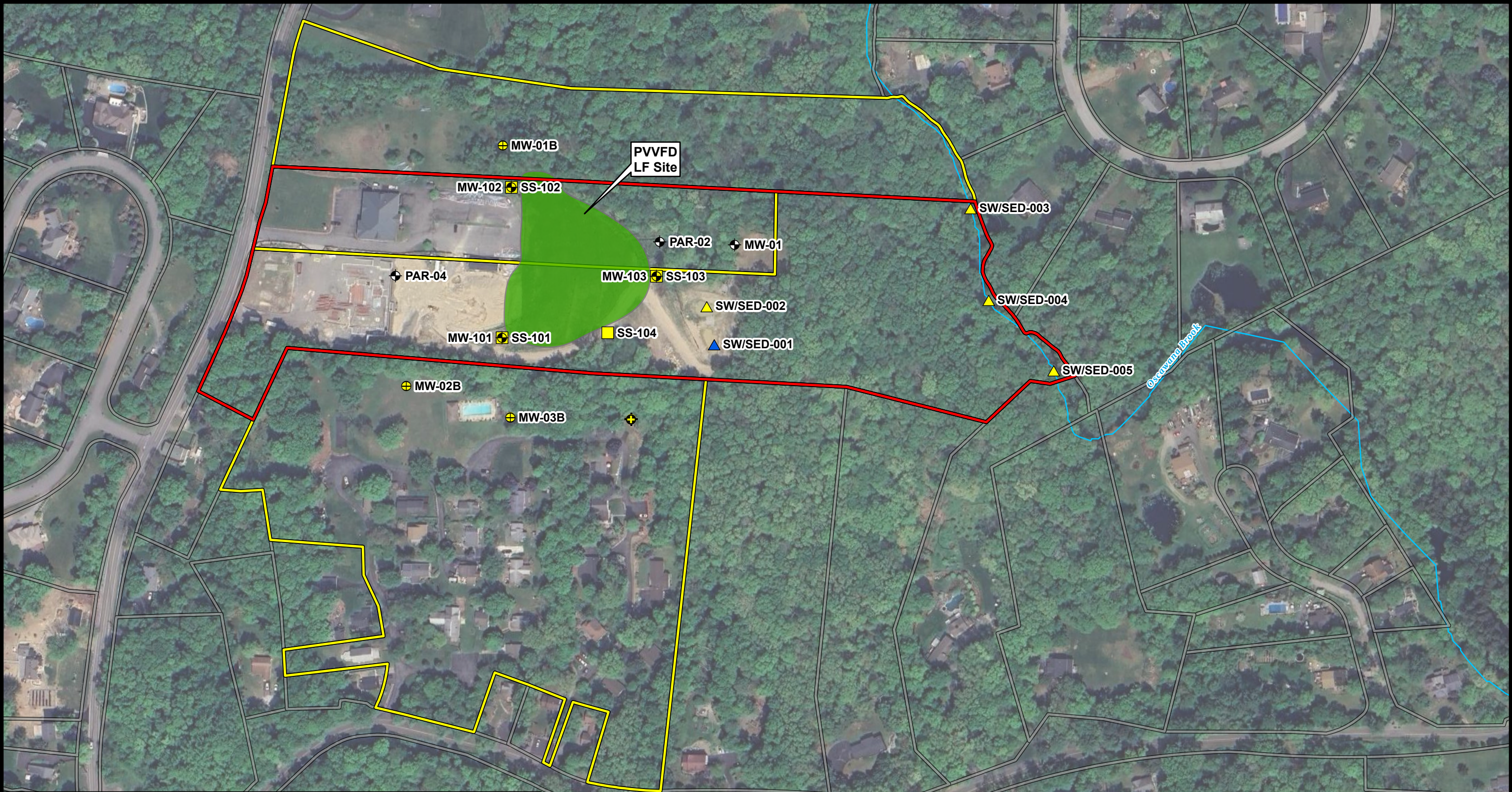
Document: S:\P\W\NYSDEC\Putnam Valley\Projects\Site Location.aprx PDF: P:\Projects\NYSDEC\Putnam Valley\SC4.0\Invest_Remed4.5\Draft Reports\PDF Reports\Figure 1 - Site Location.pdf 08-27-2025 12:12 PM jennifer.walker



NYSDEC Site # 340038
Putnam Valley Volunteer
Fire Department Landfill
Putnam Valley, New York

**EARTH
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Engineering and Geology P.C.

Site Location
Project 0038719.7119 Figure 1.1



Legend

Monitoring Well	Proposed Location	Putnam Valley Volunteer Fire Department Landfill (PVVFD LF) Site
Surface Water	Bedrock Monitoring Well	Putnam Valley Parcel Boundaries with Sampling
Stream	Overburden Monitoring Well	Parcel Boundaries
PV VFD & VAC Property Boundary	Alternative Well Location	
	Soil Boring	
	Surface Water/Sediment	

0 100 200
Feet



NYSDEC Site # 340038
Putnam Valley Volunteer
Fire Department Landfill
Putnam Valley, New York

**EARTH
ENVIRONMENT**
Engineering and Geology P.C.

Prepared/Date: JSW 10/08/25
Checked/Date: CS 10/08/25

Site Plan

Project 0038719.7119

Figure 1.2

TABLES

Table 4.1: Proposed Sampling and Analytical Program

Site Type	Media	Location ID	Sampling Interval (feet BGS)	Sample ID	VOCs Method 8260	SVOCs Method 8270	Pesticides Method 8081	Herbicides Method 8051	PCBs Method 8082	Metals Method 6010 (Note 1*)	1,4-Dioxane Method 8270 SIM	PFAS Method 1633
Microwells Surface/Subsurface Soil Sampling												
Soil Boring	Subsurface Soil	SS-101	0.2	340038-SS101000	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-101	0.2	340038-SS101000D	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-101	0.2	340038-SS101000MS	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-101	0.2	340038-SS101000MD	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-101	0.2-1	340038-SS101001								1
Soil Boring	Subsurface Soil	SS-101	TBD	340038-SS101								1
Soil Boring	Subsurface Soil	SS-102	0.2	340038-SS102000	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-102	0.2-1	340038-SS102001								1
Soil Boring	Subsurface Soil	SS-102	TBD	340038-SS102								1
Soil Boring	Subsurface Soil	SS-103	0.2	340038-SS103000								1
Soil Boring	Subsurface Soil	SS-103	0.2-1	340038-SS103001								1
Soil Boring	Subsurface Soil	SS-103	TBD	340038-SS103								1
Soil Boring	Subsurface Soil	SS-104	0.2	340038-SS104000	1	1	1	1	1	1	1	1
Soil Boring	Subsurface Soil	SS-104	0.2-1	340038-SS104001								1
Soil Boring	Subsurface Soil	SS-104	TBD	340038-SS104								1
Trip Blank	Aqueous	TBSS	NA	340038-TBSS	2							
Field Blank	Aqueous	FBSS-001	NA	340038-FB001								1
Rinse Blank	Aqueous	RBSS	NA	340038-RB	1	1	1	1	1	1	1	1
Total Soil Samples - Microwells					9	7	7	7	7	7	7	17
Bedrock Monitoring Well Surface/Subsurface Soil Sampling												
New Monitoring Well - Bedrock	Soil	MW-01B	0.2	340038-SB01B000	1	1	1	1	1	1	1	1
New Monitoring Well - Bedrock	Soil	MW-01B	0.2	340038-SB01B000D								1
New Monitoring Well - Bedrock	Soil	MW-01B	0.2	340038-SB01B000MS								1
New Monitoring Well - Bedrock	Soil	MW-01B	0.2	340038-SB01B000MD								1
New Monitoring Well - Bedrock	Soil	MW-01B	0.2-1	340038-SB01B001								1
New Monitoring Well - Bedrock	Soil	MW-01B	TBD	340038-SB01B								1
New Monitoring Well - Bedrock	Soil	MW-02B	0.2	340038-SB02B000								1
New Monitoring Well - Bedrock	Soil	MW-02B	0.2-1	340038-SB02B001								1
New Monitoring Well - Bedrock	Soil	MW-02B	TBD	340038-SB02B								1
New Monitoring Well - Bedrock	Soil	MW-03B	0.2	340038-SB03B000								1
New Monitoring Well - Bedrock	Soil	MW-03B	0.2-1	340038-SB03B001								1
New Monitoring Well - Bedrock	Soil	MW-03B	TBD	340038-SB03B								1
Trip Blank	Aqueous	TBSB	NA	340038-TB	1							
Total Soil Samples - Bedrock Wells					2	1	1	1	1	1	1	12
TOTAL SAMPLES-SURFACE/SUBSURFACE BORINGS					11	8	8	8	8	8	8	29
Sediment Sampling												
Stormwater Pond 1	Sediment	SD-001	TBD	340038-SD001	1	1	1	1	1	1	1	1
Stormwater Pond 1	Sediment	SD-001	TBD	340038-SD001D	1	1	1	1	1	1	1	1
Stormwater Pond 1	Sediment	SD-001	TBD	340038-SD001MS	1	1	1	1	1	1	1	1
Stormwater Pond 1	Sediment	SD-001	TBD	340038-SD001MD	1	1	1	1	1	1	1	1
Stormwater Pond 2	Sediment	SD-002	TBD	340038-SD002	1	1	1	1	1	1	1	1
Oscawana Brook (Upstream)	Sediment	SD-003	TBD	340038-SD003	1	1	1	1	1	1	1	1
Oscawana Brook	Sediment	SD-004	TBD	340038-SD004	1	1	1	1	1	1	1	1
Oscawana Brook (Downstream)	Sediment	SD-005	TBD	340038-SD005	1	1	1	1	1	1	1	1
Trip Blank	Aqueous	TBSD	NA	340038-TBSD	1							
Field Blank	Aqueous	FBSD-001	NA	340038-FBSD001								1
Rinse Blank	Aqueous	RBSD	NA	340038-RBSD	1	1	1	1	1	1	1	1
TOTAL SAMPLES-SEDIMENT					10	9	9	9	9	9	9	10

Table 4.1: Proposed Sampling and Analytical Program

Site Type	Media	Location ID	Sampling Interval (feet BGS)	Sample ID	VOCs Method 8260	SVOCs Method 8270	Pesticides Method 8081	Herbicides Method 8051	PCBs Method 8082	Metals Method 6010 (Note 1*)	1,4-Dioxane Method 8270 SIM	PFAS Method 1633
Surface Water Sampling												
Stormwater Pond 1	Surface Water	SW-001	0.5	340038-SW001001	1	1	1	1	1	1	1	1
Stormwater Pond 1	Surface Water	SW-001	0.5	340038-SW001000D	1	1	1	1	1	1	1	1
Stormwater Pond 1	Surface Water	SW-001	0.5	340038-SW001000MS	1	1	1	1	1	1	1	1
Stormwater Pond 1	Surface Water	SW-001	0.5	340038-SW001000MD	1	1	1	1	1	1	1	1
Stormwater Pond 2	Surface Water	SW-002	0.5	340038-SW002								1
Oscawana Brook (Upstream)	Surface Water	SW-003	0.5	340038-SW003	1	1	1	1	1	1	1	1
Oscawana Brook	Surface Water	SW-004	0.5	340038-SW004								1
Oscawana Brook (Downstream)	Surface Water	SW-005	0.5	340038-SW005								1
Trip Blank	Aqueous	TBSW	NA	340038-TBSW	1							
TOTAL SAMPLES-SURFACE WATER					6	5	5	5	5	5	5	8
New Monitoring Wells, Microwells, and Existing Monitoring Wells Groundwater Sampling												
New Monitoring Well - Bedrock	Groundwater	MW-01B	TBD	340038-MW01B	1	1	1	1	1	1	1	1
New Monitoring Well - Bedrock	Groundwater	MW-02B	TBD	340038-MW02B								1
New Monitoring Well - Bedrock	Groundwater	MW-03B	TBD	340038-MW03B	1	1	1	1	1	1	1	1
New Monitoring Well - Overburden	Groundwater	MW-101	TBD	340038-MW101								1
New Monitoring Well - Overburden	Groundwater	MW-102	TBD	340038-MW102	1	1	1	1	1	1	1	1
New Monitoring Well - Overburden	Groundwater	MW-103	TBD	340038-MW103	1	1	1	1	1	1	1	1
Existing Well	Groundwater	MW-01	TBD	340038-MW01								1
Existing Well	Groundwater	PAR-02	TBD	340038-PAR02								1
Existing Well	Groundwater	PAR-02	TBD	340038-PAR02 D								1
Existing Well	Groundwater	PAR-02	TBD	340038-PAR02 MS								1
Existing Well	Groundwater	PAR-02	TBD	340038-PAR02 MSD								1
Existing Well	Groundwater	PAR-04	TBD	340038-PAR04								1
Trip Blank	Aqueous	TBMW01	NA	340038-TBMW	1							
TOTAL SAMPLES-TEMP/PERM MONITORING WELLS					5	4	4	4	4	4	4	12
TOTAL SAMPLES-AQUEOUS					11	9	9	9	9	9	9	20

NOTES:

- indicates space for sample depth, or for QC samples, for sample # (running consecutively)
 Field Quality Control (QC) samples (duplicates [D], matrix spike [MS], matrix spiked duplicates[MD]) will be collected at a frequency of 5% (1:20 samples),
 Sample count also includes trip blanks (VOCs) and Field Blanks (PFAS).
 1* For metals analysis Method 6010, target analysis list excluding mercury and cyanide

**APPENDIX A-
SITE SPECIFIC HEALTH & SAFETY PLAN**

Health and Safety Plan Short-Form

Putman Valley VFD
Putman Valley, New York
7/10/2025

SITE HISTORY

In 2015 and 2016, nonexempt fill materials (e.g. urban fill materials and construction and demolition debris) were placed on the eastern portion of the developed areas of the Putnam Valley Volunteer Fire Department (VFD) and Ambulance Corps (AC) property for the purpose of extending the site grades for continued development. It is estimated that approximately 17,300 cubic yards of fill were placed.

In January 2019, an Order on Consent was executed between the Putnam Valley VFD and New York State Department of Environmental Conservation (NYSDEC), which required soil and fill excavation and off-site disposal, regarding of the slope area, and installation of a capping system. A deed restriction was placed on the property to limit any future development of the fill area.

A site investigation was completed in 2023 to evaluate the potential presence of contamination resulting from previous activities at the Site. It was determined that contaminants were present. The landfill was added to the NYSDEC Inactive Solid Waste Landfills list.

SITE OVERVIEW

The Putnam Valley VFD site is located at 218 Oscawana Lake Road in the Town of Putnam Valley, Putnam County, New York. The site is approximately 65,900 square feet or ~1.5 acres located on portions of two larger properties owned by the Putnam Valley VFD and AC. The two parcels together total 15.48 acres. The site is bounded by wooded areas to the north, east, and south with the northwestern portion of the site currently developed with an asphalt parking lot, one-story ambulance corps building, the partially constructed VFD building, and parking areas. Residential properties are located to the south and north of the site and across Oscawana Lake Road to the west, as well as approximately 800 feet east of the site, on the eastern side of Oscawana Brook.

HEALTH AND SAFETY CONCERNS

Site Security	Proper Communication	Driving
Slips, Trips, Falls	Poisonous Plants	Wildlife/Insects/Ticks
Working on Uneven terrain	Heat/Cold Stress	Hand Tool Safety

INVESTIGATION PLAN

Pre-Investigation activities will include utility clearing for overburden and bedrock well installations. Investigation activities will include the collection of soil samples, groundwater samples, surface water samples, and sediment samples.

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Attachments

- Attachment 1 – Contaminant Fact Sheets
- Attachment 2 – Activity Hazard Analyses
- Attachment 3 – Safety Data Sheets
- Attachment 4 – Incident Report Forms

Site: Putman Valley VFD Job #/Task # US0038719.7119
 Street Address: 218 Oscawana, Putman Valley, New York
September 8, 2025
through December 19,
 Proposed Date(s) of Investigation: 2025
 Prepared by: Hannah Bradish Date: 07/10/2025
 *Approved by: Chuck Staples Date: 08/25/25
 Site Description: **(attach map)** The site is approximately 65,900 square feet or ~1.5 acres located on portions of two larger properties (Tax ID#s 72.20-1-7.11 and 72.20-1-7.12) owned by the Putnam Valley Volunteer Fire Department and the Putnam Valley Volunteer Ambulance Corp. The two parcels together total 15.48 acres. The site is bounded by wooded areas to the north, east, and south and the northwestern portion of the site is currently developed with an asphalt parking lot and one-story ambulance corps building and parking area. Residential properties are located to the south and north of the site and across Oscawana Lake Road to the west, as well as approximately 800 feet east of the site.

Comments: _____

*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Tasks:

EEEG	Sub	Task Description	AHA Attached?
☐	☒	Soil Sampling via Direct Push/Drilling	☒
☐	☒	Overburden and bedrock well installation	☒
☒	☐	Groundwater sampling via low flow	☒
☒	☐	Surface water sampling	☒
☒	☐	Sediment sampling via Hand Auger	☒
☐	☐		☐
☐	☐		☐
☐	☐		☐

High Hazard Activities:

EEEG	Sub	Activity	EEEG	Sub	Activity
☐	☐	Confined space entry	☐	☒	Operating drill rig
☐	☐	Entering excavations	☐	☒	Operating other heavy equipment
☐	☐	Hot work	☐	☐	Using aerial lift
☐	☐	Lockout/tagout	☐	☐	Working from scaffolding
☐	☐	Operating forklift	☐	☐	Working at heights >6 feet

Life Saving Actions:

The following Life Saving Actions potentially apply to the work being conducted at the site:

- ☒ Plant / People Interaction - Working around heavy equipment
- ☒ Driving
- ☐ Suspended Loads
- ☐ Hazardous Substances/Atmospheres
- ☐ Working at Heights
- ☐ Energy Sources

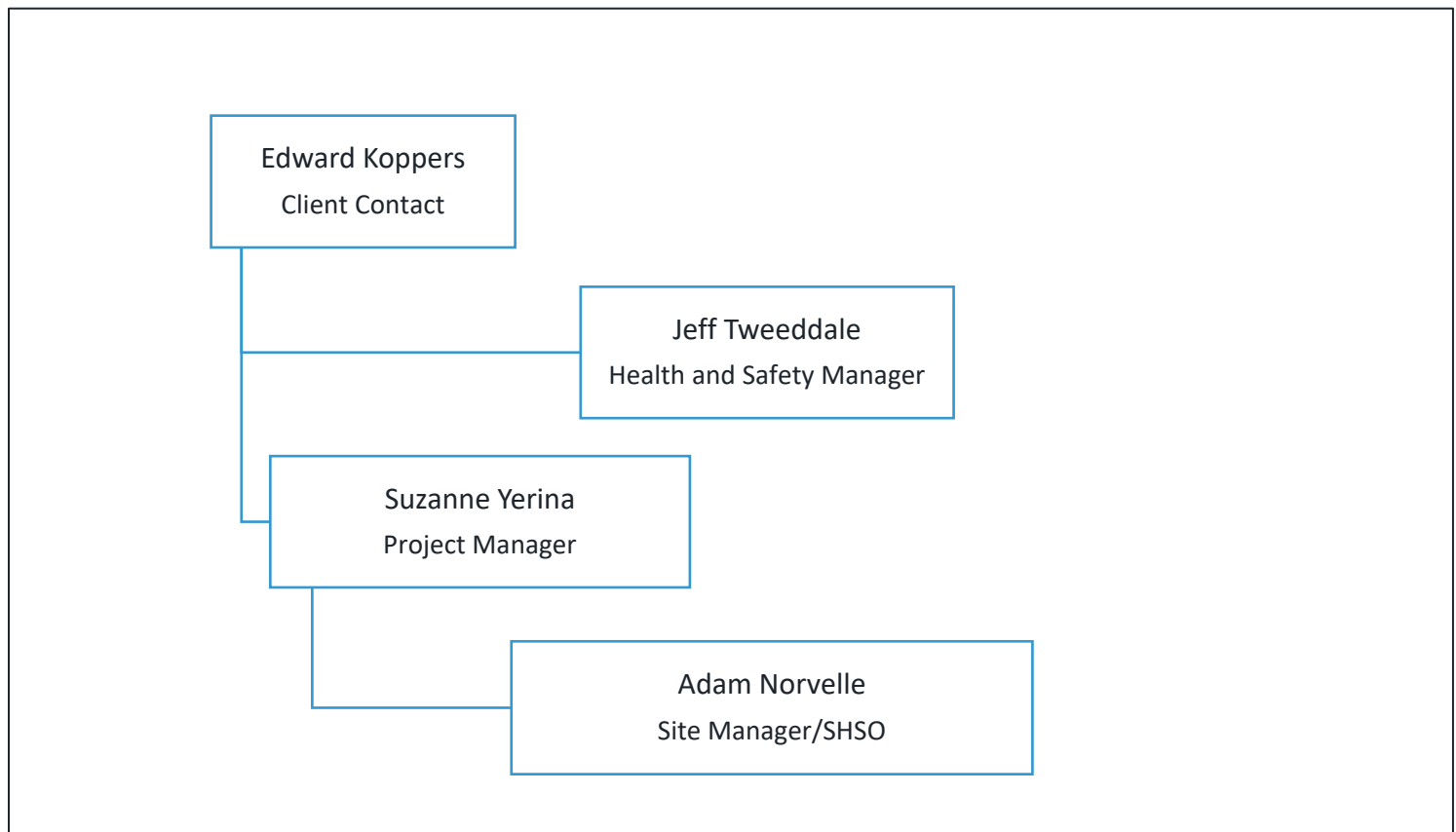
- ☒ Working on/near Water
☐ Ground Stability
☒ Lone or Remote Work

Life Saving Actions

Plant/People Interaction	Driving	Suspended Loads
I Will - Position myself to be visible with the equipment operator and to avoid interactions with moving equipment. - Establish and obey signage, pedestrian paths, barriers, and exclusion zones. - Obtain authorization from equipment operator prior to entering the zone of influence of mobile plant/equipment. 	I Will - Only use a vehicle that is fit for purpose and checked prior to driving. - Drive at a speed appropriate to the conditions and adhering to the road rules. - Not use personal devices while driving except for hands-free navigation. - Plan my journey to include regular breaks and fatigue checks. 	I Will - Confirm that the equipment and load have been inspected and are fit for purpose. - Establish and obey barriers and exclusion zones. - Observe the instructions given by the banksman/flagman. - Not place myself under a suspended load. 
Hazardous Substances/Atmospheres	Working at Heights	Energy Sources
I Will - Identify and control exposure to hazardous substances / atmospheres before starting work. - Understand and follow the required procedures for entering a confined/restricted space. - Test and monitor the atmosphere before entering and during work. - Establish a rescue plan before entering a confined/ restricted space. 	I Will - Implement appropriate fall prevention / protection measures when exposed to a fall risk. - Establish a rescue plan before commencing work at heights. - Only work from or operating a mobile elevated work platform if trained, competent, and authorized to do so. 	I Will - Identify all energy sources before work begins. - Confirm that energy sources have been isolated and zero energy verified prior to undertaking work. - Locate and control all buried and overhead services before starting work. 
Working on/near Water	Ground Stability	Lone or Remote Work

I Will - Assess the weather and environmental conditions when working on/around water. - Not work alone from a vessel or near fast flowing or cold water. - Wear appropriate Personal Flotation Devices where required. - Establish a rescue plan before working on/near water. 	I Will - Visually inspect all excavations, ground structures and ground support prior to working. - Not enter areas of unsupported ground without appropriate ground stability measures in place. - Place equipment and spoil at a safe distance from excavations. 	I Will - Carry reliable means of communication for check-ins and emergency calls. - Establish a communication plan with reporting times and escalation procedure. - Develop and test and emergency response and rescue plan. - Have appropriate survival gear and training including first aid. 

Project Organization Chart:



Dates of Required Training and Medical Surveillance:

Add additional training topics, as required.

Job duties:	Site Manager SHSO	Field Staff	Field Staff	Field Staff	Field Staff
Names:	Adam Norvelle	John Walsh	Maria Guerra	Hannah Bradish	Delaney Wood
	Dates	Dates	Dates	Dates	Dates
Medical Surveillance					
40-Hour Initial					
8-Hour Supervisor²					
8-Hour Refresher					
First Aid¹					
CPR¹					
Hazard Communication					
Fire Extinguisher					

¹ At least one worker must be trained in First Aid/CPR

² Required for Site Manager and Site Health and Safety Officer

Goals/Targets:

The following goals/targets have been established for the project:

- ☒ Zero OSHA Recordable Incidents
- ☐ Weekly HSE Inspections (documented)
- ☐ Leadership (PM) HSE Inspections
- ☒ iSMS observations as needed

Meetings:

The following meetings will be held at the site:

Meeting	Lead by		Frequency				As Needed
	WSP	Sub	Initial	Daily	Weekly	Monthly	
☒ Project Kick-off ¹	☒	☐	☒	☐	☐	☐	☐
☒ Tailgate ²	☒	☐	☐	☒	☐	☐	☐
☐ Safety Committee ¹	☐	☐	☐	☐	☐	☐	☐
☒ Incident Reviews ¹	☐	☐	☐	☐	☐	☐	☒
☐ E&I Monthly Safety Topics ¹	☐	☐	☐	☐	☐	☐	☐
☐ HSE Closeout Meetings ¹	☐	☐	☐	☐	☐	☐	☐

¹ Attended by subcontractor management representative

² Attended by all subcontractor employees and supervisors.

Inspections:

Regular inspections will be conducted by WSP USA and/or subcontractor personnel. Inspections will be documented, and corrective actions established for all findings. Corrective actions will be tracked to closure. iSMS observations will be entered into the iSMS database.

Inspection Type	Lead by		Frequency			
	WSP	Sub	Daily	Weekly	Monthly	Before Use
☒ HSE (Visual)	☒	☐	☒	☐	☐	☐
☒ HSE (Documented)	☒	☐	☐	☒	☐	☐
☐ Leadership HSE (e.g., PM)	☐	☐	☐	☐	☐	☐
☐ Scaffolding	☐	☐	☐	☐	☐	☐
☐ Excavations	☐	☐	☐	☐	☐	☐
☒ Heavy Equipment	☒	☒	☐	☐	☐	☒
☒ PPE	☒	☐	☒	☐	☐	☒
☒ Tools/Equipment	☒	☐	☐	☐	☐	☒
☒ iSMS/Observations	☒	☐	☐	☐	☒	☐

SITE MAP



Journey Management Plan:

A Journey Management Plan will be developed to address non-routine/non-commute type travel to and from the project site. Considerations will include anticipated weather, work duration prior to travel, travel route, etc. See the Vehicle Travel – Journey Management Plan AHA.

JOURNEY MANAGEMENT PLANNING		
<i>All projects with a field component must have a journey management plan completed for each work location. Complete the below as accurately as possible with your knowledge of the project, site location, time of year, etc. If there are significant changes to the scope of the project, or the conditions of travel, the plan must be updated, or new journey management plan must be completed.</i> Not required for city or urban driving		
	Points	List Control Measures
1. How many total hours will the driver have been on duty at the end of the journey? Note: Maximum 14 duty hours permitted. (12+ hours = 10 pts)	5	
2. Will the overall journey distance exceed 120 miles/-200km? (Yes = 10 pts)	5	Take breaks from driving as needed to maintain alertness.
3. Will the journey require driving in wet, flooded, icy, and/or snowy roads? (Yes = 10 pts)		
4. Will the journey require driving in conditions that limit visibility (dark, fog, snow, hail, etc.)? (Yes = 10 pts)		
5. Will the journey require driving overnight (after 9pm - 5am)? (Yes = 10 pts)		
6. Is the driver familiar with the route for this journey? (No = 5 pts)	5	Review a map of the route/directions to the Site before embarking.
7. How many hours of sleep has the driver had in the past 24 hours? (If < 8 hrs = 5 pts)		
8. Will there be a passenger in the vehicle during the journey? (No = 5 pts)	5	Take periodic coffee/stretch breaks to maintain alertness levels.
9. Is heavy traffic congestion expected during the journey? (Yes = 5 pts)		
10. Was a pre-trip inspection performed (walk around, towing, load securement, etc.)? (No = 5 pts)		
11. Is the vehicle towing a heavy or oversized load OR permit required? (Yes = 5 pts)		
12. Will the driver encounter unpaved or mountainous road conditions? (Yes = 5 pts)		
13. In case of emergency, will the driver have suitable means of communication? (No = 5 pts)		
14. Are there elevated security risks associated with this journey? (Yes = 5 pts)		
15. Is there an elevated risk of striking an animal on the roadway during this journey? (Yes = 5 pts)		
TOTAL	20	Low Risk = 0-25 pts, Medium Risk = 30-55 pts requires mitigation, High = 60 or more requires Management Approval
Workers must also establish a check in/check out system for any project where there is significant driving and where they will not be returning to the office at the end of the day. This process should be documented.		

Known or Suspected Contaminants (include PELs/TLVs):

[illegible]

*Workers must be made aware of the signs, symptoms, and first aid for each COC. Information is located on the COC fact sheets.

****See (LINK) for OSHA PELs and ACGIH TLVs**

Contaminant of Concern Fact Sheets are included in **Attachment 1**

Air Monitoring Action Levels:

PID/FID Reading ¹	Detector Tube ¹ :	Dust Meter ¹	LEL ² /O ₂ ¹	Action
Above Background Level				Continue to monitor with PID. Modified Level D PPE
>5 ppm				Stop work and contact PM and H&S Manager Continue to monitor with PID/ Upgrade Level C PPE

¹ Sustained readings measured in the breathing zone² Readings at measured at the source (borehole, well, etc.)

AHAs:

Check and attach all that apply (AHA's are included in **Attachment 2**):

Activity Specific AHAs:

- ☒ Mobilization/Demobilization and Site Preparation
- ☒ Field Work - General

Hazard Specific AHAs:

- ☒ Insect Stings and Bites
- ☒ Poisonous Plants

PID/FID Reading ¹	Detector Tube ¹	Dust Meter ¹	LEL ² /O ₂ ¹	Action
☒	Field Work - Oversight		☒	Drilling Operations
☒	Decontamination			
☒	Utility Clearance Activities			
☒	Soil Sampling			
☒	General Use of Power Tools and Hand Tools			
☒	General Utility Knife Use			
☒	Geoprobe			
☒	Groundwater sampling			
☒	Surface Water Sampling			

Review of AHAs

Supervisors shall conduct a daily tailgate meeting, specifying the applicable AHAs and ensure that everyone involved in the work acknowledges the AHA or daily renewal forms applicable to their work.

The work area shall be inspected for any additional hazards prior to initiating work. Where additional hazards are present, the hazards and controls shall be identified prior to initiating the work and documented on the AHA.

If there is a change or deviation from the planned activity, you must stop the job and re-evaluate the risk assessment and the precautions taken. Any changes to the work described in the AHA shall require a review by a Qualified Person.

PPE and Monitoring Instruments:

Revise table to include all tasks listed above. Revise list of PPE to include the specific types required for the project. Refer to the [PPE Selection Guide](#) and contact your HSE coordinator, Regional HSE Manager, or the US Director of HSE for help. You can delete rows or columns that don't apply.

Initial Level of PPE *

☒ Level D ☐ Modified Level D ☐ Level C * Cannot use Short Form HASP for Level B or A or Confined Space Entry work

Personal Protective Equipment	Utility Locating	Drilling/Direct-push	Field Work (Groundwater, surface water, sediment sampling, etc.)	Decontamination									
Hard hat		X											

Personal Protective Equipment	Utility Locating	Drilling/Direct-push	Field Work (Groundwater, surface water, sediment sampling, etc.)	Decontamination									
Safety glasses	X	X	X	X									
Safety Goggles													
Hearing protection (earmuffs, earplugs)		X											
Safety-toed boots	X	X	X	X									
Chemical resistant boots or boot covers		A	A	A									
High-visibility/ reflective vest	X	X	X	X									
Nitrile gloves - thicker (outer)	A	A	A	A									
Nitrile gloves - thin (inner)	A	X	X	X									
Vinyl gloves (inner)	A	X	X	X									
Other chemical resistant gloves: _____	A	X	X	X									
Work gloves (leather or cut resistant)	A	A	X	A									
Uncoated Tyvek coverall				A									
Polycoated Tyvek coverall				A									
Saranex Tyvek Coveralls				A									
Dust Mask		A	A	A									

X = required A = available

Monitoring Instruments Required*

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

☒ PID:
 ☒ 10.0/10.6 eV Lamp
 ☐ 11.7 eV Lamp
 ☐ FID
☐ Hydrogen Sulfide meter
 ☐ Carbon Monoxide meter
 ☐ Other: _____
☐ LEL/O2 Meter
 ☐ Dräger Pump (or equivalent)
 List Tubes: Vinyl Chloride

☐ Dust Meter: ☐ Respirable dust ☐ Total dust

*Monitoring instruments will be calibrated daily in accordance with manufacturer's instructions. Results will be recorded in the field logbook.

Chemicals Brought to the Site:

List all chemicals brought to the site (e.g., preservatives, decon solutions, calibration gases, gasoline, etc.).

Product Identifier: (Note: Name listed below must match name on label and SDS)

ALCONOX

LIQUINOX

DEIONIZED WATER

SDS Attached?



Safety Data Sheets (SDS's) are included in **Attachment 3**.

Chemicals will be kept in their original containers. If transferred to another container, aside from day use by one individual, the new container will be clearly labeled with the name of the chemical (product identifier), signal word, hazard statement, pictogram(s), precautionary statement, and name, address and telephone number of the chemical manufacturer, importer, or other responsible party.

Work Zones:

The work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area within a 20-foot diameter of the sampling location. The Decontamination Zone is to be located upwind of the work area. Work zones will be maintained through the use of:



Warning Tape



Cones and Barriers



Visual Observations

Decontamination Procedures and Equipment:

Note: See Decontamination AHA for further information

Level D Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4: Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Modified Level D and Level C PPE Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: Canister or Mask (Level C only) Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5: Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: Face Piece Removal (Level C only)	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Site Communication:

On-sight Communication requirements (Lone worker procedure)

The on-site FOL is responsible for an **A.M** and **P.M** check in to the Task Lead. This can be done by calling, texting or Microsoft Teams chat. A pre-work call to **Suzanne Yerina** is required to discuss the day's activities. If there is more than one team of two on-site, communication between the teams is required if the teams cannot see each other. This can be done by calling, texting or calling out to the other team. If a team does not respond, work shall stop until the teams can visually connect with each other. This should be conducted every hour. If only one team of two is onsite, they must be always in visual sight of each other. In an emergency event, either health and safety or quickly changing scope conditions, the Project Manager, **Suzanne Yerina**, must be contacted within the hour.

- ☒ Verbal
- ☐ Two-way radio
- ☒ Cellular telephone
- ☐ Hand signals
 - Hand gripping throat _____ Out of air, can't breathe
 - Grip partner's wrist or both hands around waist _____ Leave area immediately
 - Hands on top of head _____ Need assistance
 - Thumbs up _____ OK, I am all right, I understand
 - Thumbs down _____ No, negative
- ☐ Horn
- ☐ Siren
- ☐ Other: _____

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department: Putman Valley Fire Department	Emergency: 911 Non-Emergency: 1-(845)526-2879		
Hospital: Hudson Valley Hospital Center	1-(914)737-9000		
Work Care	1-(844)268-1852		
Police Department: Putman County Sheriff's Department	Emergency: 911 Non Emergency: 1-(845)225-4300		
	Office	Cell	
Site Safety and Health Officer/ FOL: Adam Norvelle	978-848-0958		
Client Contact: Edward Koppers		518-402-9759	
Project Manager: Suzanne Yerina	207-910-1059	207-841-1387	
HSE Manager: Jeff Tweeddale		860-805-5883	
Corporate SVP of HSE: Renee Weaver		336-707-3869	
EPA/DEP (if applicable):			
Other: Ambulance	911		

*See Incident Flow Chart for Regional HSE Manager's Contact Information

Emergency Equipment:

The following emergency response equipment is required for this project and shall be readily available:

- ☒ Field First Aid Kit (including bloodborne pathogen kit/supplies)
- ☐ Fire Extinguisher (ABC type)
- ☒ Eyewash (Note: 15 minutes of free-flowing fresh water)
- ☐ Other: _____

Emergency Procedures:

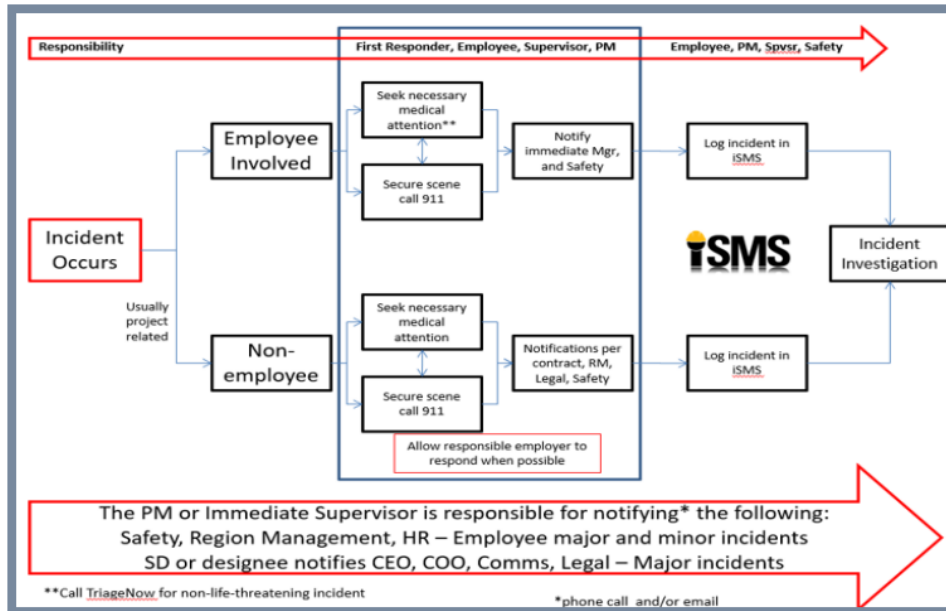
- The SSHO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The SSHO notifies the Project Manager of the emergency within the hour.
- If the emergency involves an injury to a WSP employee, the HSE Coordinator or Site Manager are to implement the WSP Early Injury Case Management program. See procedures and Flow Diagram below:
- If applicable, the SSHO shall notify off-site emergency responders (e.g., fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SSHO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher but only if trained within the past year. Use the **PASS** method (**P**ull the pin, **A**im at the base of the fire, **S**queeze the trigger, use a **S**weeping motion to put out the fire) when extinguishing fires. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE (e.g., level C or B PPE - if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call-in emergency personnel.
- For chemical spills, follow the job specific AHA and SDS for spill containment and spill handling procedures.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash bottle/station for the eyes and wash affected area. Site worker should shower as soon as possible after incident.
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe, that the required PPE and air monitoring equipment is available. Entry is prohibited if PPE or air monitoring equipment is inadequate.
- An injured worker shall be decontaminated appropriately.
- Within 24 hours after any emergency response, the initial Incident Analysis Report shall be completed and submitted to the WSP E&I US Director of HSE. If the injury involves vehicles or overhead/underground utilities, also complete the Vehicle Incident Report (VIR) and Ground Disturbance Report (GDR), respectively. When the use of drugs or alcohol cannot be ruled out as a factor in the incident, contact P&O to determine if post-accident drug testing is required.

EEEG Early Injury Case Management Program

NON-EMERGENCY INCIDENT	EMERGENCY INCIDENT
Steps 1 & 2 must be completed before seeking medical attention other than local first aid. 1. Provide first aid as necessary. Report the situation to your immediate supervisor <u>and</u> HSE Coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence). 2. Injured employee:	1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Lauren Gallagher at 602-757-3211. 2. Once medical attention is sought and provided, the supervisor must:
Call Work Care 24/7 Hotline* (844) 268-1852	
Work Care will assess the situation and determine whether the incident requires further medical attention. During this process, Work Care will perform the following: • Explain the process to the caller. • Determine the nature of the concern. • Provide appropriate medical advice to the caller. • Determine appropriate path forward with the caller. • Maintain appropriate medical confidentiality. • Help caller to execute path forward, including referral to the appropriate local medical facility. • Send an email notification to the Corporate HSE Department.	Work Care will be responsible for performing the following: • Contact the treating physician. • Request copies of all medical records from clinic. • Send an email update to the corporate HSE department.
3. IMMEDIATELY after contacting Work Care, send a brief email notification <u>and</u> inform verbally (direct contact is required) <u>one</u> of the HSE corporate representatives. See Figure 15.1. 4. Make all other local notifications and client notifications. 5. Local Supervisor, HSE Coordinator, SHSO, and any applicable safety committees must complete the preliminary investigation, along with the initial Incident Report within 24 hours. 6. Corporate Loss Prevention Manager to complete Worker's Compensation Insurance notifications as needed. 7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons-learned materials. * NOTE: Step 2 is applicable only to the North American operations and to incidents involving EEEG personnel. High-potential near misses, subcontractors' incidents, regulatory inspections, spills, and property damages above \$1,000 should be reported immediately, following the directions in Step 3.	

Site Specific Emergency Procedures are as follows:

INCIDENT FLOW CHART



**For workplace injuries call
TriageNow: (877) 311-0038**

Enter all incidents into iSMS
within 24hours



Get it on Google Play



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Renee Weaver Renee.weaver@wsp.com	E&E USA	(336) 707-3869 (cell)
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Jeff Tweeddale jeff.tweeddale@wsp.com	Northeast Region: New England / New York/Midwest/Plains	(860) 805-5883 (cell)
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Leslie Fisher Leslie.Fisher@wsp.com	Mining	(928) 965-1366 (cell)
Tom Bemrich Tom.Bemrich@wsp.com	Radiation Safety	(602) 315-2647 (cell)
Zach Manthey Zach.Manthey@wsp.com	Lab Safety	(602) 616-7703 (cell)

Incidents requiring reporting include injuries, illnesses, high potential near misses, unsafe work refusals, workplace violence / harassment, security incidents, subcontractor incidents, regulatory inspections, spills, and property damage.

The Supervisor is responsible for Local/Client Notifications and Drug/Alcohol Testing coordination as per client requirements.

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Field Team Review:

I acknowledge that I understand the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

[illegible]

Routes to Emergency Medical Facilities:

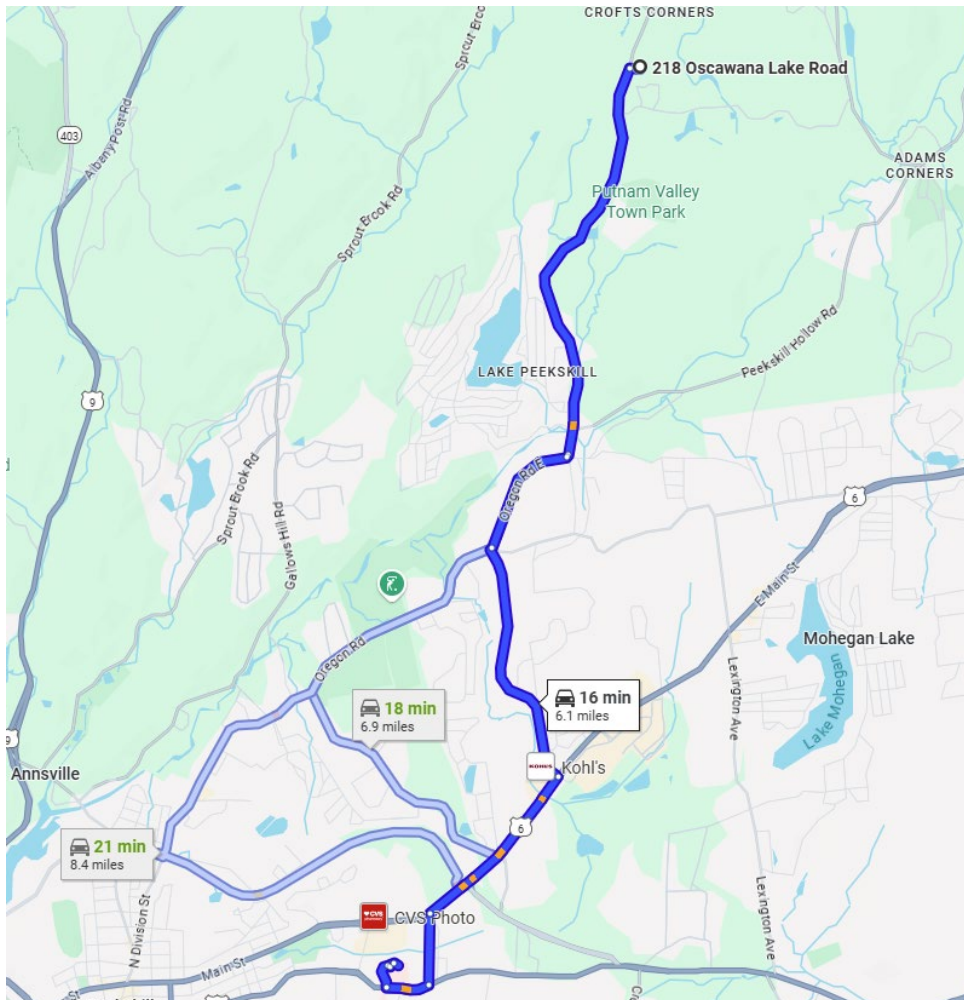
HOSPITAL (for immediate emergency treatment):

Facility Name: New York Presbyterian Hudson Valley Hospital

Address: 1980 Crompond Road, Cortlandt Manor, NY 10567

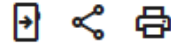
Telephone Number: 1- 914-737-9000

DIRECTIONS TO PRIMARY HOSPITAL:



← from 218 Oscawana Lake Rd, Putnam Valley, NY ...
to NewYork-Presbyterian Hudson Valley Hospita...

16 min (6.1 miles)



via Oscawana Lake Rd

Fastest route, lighter traffic than usual

218 Oscawana Lake Rd

Putnam Valley, NY 10579

- ↑ Head west toward Oscawana Lake Rd
15 sec (279 ft) —————
- Continue on Oscawana Lake Rd. Take Westbrook Dr to Conklin Ave in Cortlandt
12 min (5.2 mi) —————
- ↶ Turn left after Valvoline Instant Oil Change (on the left)
54 sec (0.4 mi) —————
- ↷ Turn right onto Crompond Rd
36 sec (0.2 mi) —————
- Drive to your destination
2 min (0.2 mi) —————

NewYork-Presbyterian Hudson Valley Hospital

1980 Crompond Rd, Cortlandt, NY 10567

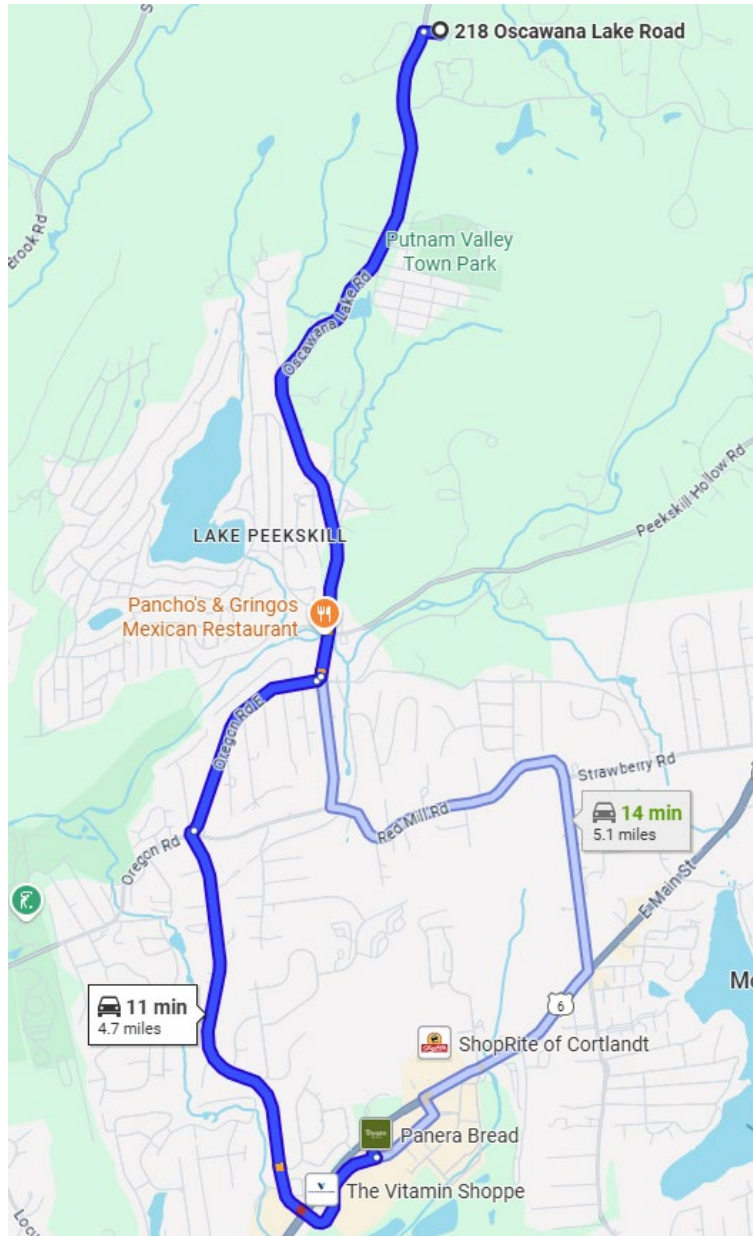
CLINIC (for non-emergency medical treatment):

Facility Name: **PhysicianOne Urgent Care Mohegan Lake**

Address: **3085 E Main St, Mohegan Lake, NY 10547**

Telephone Number: **1-860-650-3848**

DIRECTIONS TO CLINIC (attach map):



← from 218 Oscawana Lake Rd, Putnam Valley, NY ...
to 3085 E Main St, Mohegan Lake, NY 10547

11 min (4.7 miles)



via Oscawana Lake Rd and Westbrook Dr
Fastest route, lighter traffic than usual

218 Oscawana Lake Rd

Putnam Valley, NY 10579

↑ Head west toward Oscawana Lake Rd

279 ft

↩ Turn left onto Oscawana Lake Rd

2.2 mi

↗ Use any lane to turn slightly right onto Old Oregon Rd

92 ft

⤴ Merge onto Oregon Rd E

0.7 mi

🔄 At the traffic circle, take the 3rd exit onto Westbrook Dr/Westbrook Ct

1.7 mi

↩ Turn left

i Destination will be on the right

92 ft

3085 E Main St

Mohegan Lake, NY 10547

Tailgate Safety Meeting Form

Check One:

☐ Initial Kickoff Safety Meeting ☐ Regular/Daily Tailgate Safety Meeting ☐ Unscheduled Tailgate Safety Meeting

Date: _____ Site: _____

Site Manager: _____ Site Health and Safety Officer: _____
Print *Print*

Order of Business

Topics Discussed (Check all that apply)

☐ Scope of Work	☐ Decontamination Procedures for Personnel and Equipment
☐ Site History/Site Layout	☐ Physical Hazards and Controls (e.g., overhead utility lines)
☐ Personnel Responsibilities	☐ Anticipated Weather (snow, high winds, rain)
☐ Training Requirements	☐ Temperature Extremes (heat or cold stress symptoms and controls)
☐ Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazard effects)	☐ Biological Hazards and Controls (e.g., poison ivy, spiders)
☐ Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)	☐ Site Control (visitor access, buddy system, work zones, security, communications)
☐ Safe Work Practices	☐ Sanitation and Illumination
☐ Engineering Controls	☐ Logs, Reports, Recordkeeping
☐ Chemical Hazards and Controls	☐ Incident Reporting Procedures
☐ Signs and symptoms of over exposure to site chemicals	☐ Near Misses/Hazard ID including worker suggestions to correct and work practices to avoid similar occurrences
☐ Medical Surveillance Requirements	☐ General Emergency Procedures (e.g., locations of air horns and what 1 or 2 blasts indicate)
☐ Action Levels	☐ General Emergency Response Procedures (e.g., earthquake response, typhoon response, etc.)
☐ Monitoring Instruments and Personal Monitoring	☐ Medical Emergency Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
☐ Perimeter Monitoring, Type and Frequency	☐ Route to Hospital and Medical Care Provider Visit Guidelines
☐ PPE Required/PPE Used	☐ Site/Regional Emergency Response Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
☐ Define PPE Levels, Donning, Doffing Procedures	☐ Hazardous Materials Spill Procedures

PPE required for the tasks to be conducted: _____

Required Permits: _____

Site Access or other issues: _____

Safety Suggestions by Site Workers: _____

Tailgate Safety Meeting Form

Action Taken on Previous
Suggestions: _____

Injuries/Incidents/Personnel Changes since last meeting: _____

Observations of unsafe work practices/conditions that have developed since previous meeting: _____

Location of (or changes in the locations of) evacuation routes/safe refuge areas: _____

Additional Comments: _____

Attendee signatures below indicate acknowledgment of the information and willingness to abide by the procedures discussed during this safety meeting

Name (Print)	Company	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Meeting Conducted by: _____ Title: _____
Print

Signature: _____ Time: _____
Print

Attachment 1

Contaminant Fact Sheets

CONTAMINANT FACT SHEET

HEALTH HAZARD DATA									
 CONTAMINANT FACT SHEET Chemical Name: Perfluoro-n-Octanoic Acid (PFOA) CAS Number: 864071-09-0 Synonyms: PFOA PENTADECAFLUORO-N- OCTANOIC ACID-1; CF ₃ (CF ₂) ₆ ¹³ COOH; PERFLUOROCTANOIC ACID-1		Color: <u>white to off white powder</u>		Physical State: Solid ☒ Liquid ☐ Gas ☐		Corrosive, toxic. Odor: <u>NA</u>		Odor Threshold: <u>NA</u>	
		Vapor Density: <u> </u>		Vapor Pressure: <u>0.52 mmHg @ 25 °C</u>		Ionization Potential (IP): <u>NA</u>		IDLH: <u>NA</u>	
		Route of Entry: <u>Inh, Ing, Con</u>							
		Carcinogen: OSHA <u> </u> IARC <u> </u> NTP <u> </u> ACGIH <u> </u> NIOSH <u> </u> Skin absorbabl Yes ☒ No <u> </u> Skin corrosive: Yes ☒ No <u> </u> Signs/Symptoms of Acute Exposure: <u>Inhalation may cause spasm, chemical</u> <u>pneumonitis, and pulmonary edema.</u> <u>Symptoms of exposure include burning</u> <u>sensation, coughing, wheezing, laryngitis,</u> <u>shortness of breath, headache, nausea, and</u> <u>The best of our knowledge, the chemical, physical,</u> <u>mucous membranes, upper resp tract, eyes, and sk</u>				Source OSHA PELs ACGIH TLVs NIOSH RELs DFG MAKs TWA (units) mg/m ³ STEL (units) ppm C (units) ppm			
AIR MONITORING					PERSONAL PROTECTIVE EQUIPMENT			FIRE/REACTIVITY/FIRST AID DATA	
Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level	<u>Recommended Protective Clothing Materials:</u> Suits <u>Polycoated</u> _____ _____ Gloves <u>Rubber</u> _____ _____ Boots <u>Rubber</u> _____ _____ _____ Service Limit Concentration (ppm): _____ MUC 1/2 Mask APR = TWA x 10 = <u>0.05 mg/m3</u> *MUC Full-Face APR = TWA x 50 = <u>0.25 mg/m3</u> *Only with quantitative fit testing.			Flash Point: <u>NA</u> LEL/UEL: <u>NA</u> Fire Extinguishing Media: Dry Chemical ☒ Foam ☒ Water Spray ☒ CO ₂ ☒ Incompatibilities: <u>Bases, oxidizing agents, reducing agents.</u> First Aid: <u>Oral exp - If swallowed and awake wash out mouth w/water. Inh exp - provide fresh air.</u> <u>If not breathing, provide CPR. If breathing is difficult, give oxygen. Derm/eye exp - Flush with water for 15</u>	
Personal Sampling									
**Dust meter - Action limit will be based on soil concentrations. Contact C. Sundquist for action limits				**					
Checked by: Cindy Sundquist Date: 7/24/2023									

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Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

NE = None Established

Abs = Skin Absorption

Inh = Inhalation

NA = Not Applicable/Not Available

Ing = Ingestion

Con = Skin and/or Eye contact



Perfluorooctane Sulfonate (PFOS)

CONTAMINANT FACT SHEET

 CONTAMINANT FACT SHEET Chemical Name: Perfluorooctane Sulfonate (PFOS) CAS Number: 1763-23-1 Synonyms: Perfluorooctylsulfonic acid; Perfluorooctane sulfonic acid; PFOS; 1-Perfluorooctanesulfonic acid; Heptadecafluoro-1-octanesulfonic acid;		HEALTH HAZARD DATA <table border="1"> <tr> <td>Color:</td> <td><u>White to yellowish</u></td> <td rowspan="4">Carcinogen:</td> <td>OSHA</td> <td><u> </u></td> <td rowspan="4">Source</td> <td rowspan="4">TWA (units) mg/m³</td> <td rowspan="4">STEL (units) ppm</td> <td rowspan="4">C (units) ppm</td> </tr> <tr> <td>Physical State:</td> <td>Solid <u>X</u></td> <td>IARC</td> <td><u> </u></td> </tr> <tr> <td></td> <td>Liquid <u> </u></td> <td>NTP</td> <td><u> </u></td> </tr> <tr> <td></td> <td>Gas <u> </u></td> <td>ACGIH</td> <td><u> </u></td> </tr> <tr> <td>Corrosive, toxic.</td> <td></td> <td></td> <td>NIOSH</td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Odor:</td> <td><u>NA</u></td> <td>Skin absorbabl</td> <td>Yes <u> </u></td> <td>No <u> </u></td> <td>PELs</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Odor Threshold:</td> <td><u>NA</u></td> <td>Skin corrosive:</td> <td>Yes <u>X</u></td> <td>No <u> </u></td> <td>ACGIH TLVs</td> <td><u>NA</u></td> <td></td> <td></td> </tr> <tr> <td>Vapor Density:</td> <td><u> </u></td> <td colspan="3" rowspan="4"> Signs/Symptoms of Acute Exposure: Causes burns to skin and eyes. Moisture sensitive. Corrosive. Harmful if swallowed. May cause severe and permanent damage to the digestive and respiratory tract. Causes gastrointestinal tract burns. </td> <td>NIOSH RELs</td> <td><u>NA</u></td> <td></td> <td></td> </tr> <tr> <td>Vapor Pressure</td> <td><u>NA</u></td> <td>DFG MAKs</td> <td>0.01 Skin</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Ionization Potential (IP)</td> <td><u>NA</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>IDLH:</td> <td><u>NA</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Route of Entry:</td> <td><u>Inh, Ing, Con</u></td> <td colspan="3"></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										Color:	<u>White to yellowish</u>	Carcinogen:	OSHA	<u> </u>	Source	TWA (units) mg/m ³	STEL (units) ppm	C (units) ppm	Physical State:	Solid <u>X</u>	IARC	<u> </u>		Liquid <u> </u>	NTP	<u> </u>		Gas <u> </u>	ACGIH	<u> </u>	Corrosive, toxic.			NIOSH	<u> </u>					Odor:	<u>NA</u>	Skin absorbabl	Yes <u> </u>	No <u> </u>	PELs				Odor Threshold:	<u>NA</u>	Skin corrosive:	Yes <u>X</u>	No <u> </u>	ACGIH TLVs	<u>NA</u>			Vapor Density:	<u> </u>	Signs/Symptoms of Acute Exposure: Causes burns to skin and eyes. Moisture sensitive. Corrosive. Harmful if swallowed. May cause severe and permanent damage to the digestive and respiratory tract. Causes gastrointestinal tract burns.			NIOSH RELs	<u>NA</u>			Vapor Pressure	<u>NA</u>	DFG MAKs	0.01 Skin				Ionization Potential (IP)	<u>NA</u>						IDLH:	<u>NA</u>						Route of Entry:	<u>Inh, Ing, Con</u>															
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Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

Abs = Skin Absorption

NE = None Established

Ing = Ingestion

NA = Not Applicable/Not Available



Attachment 2

Activity Hazard Analyses

AHA - Decontamination



Activity/Work Task:	Decontamination			Overall Risk Assessment Code (RAC) (Use highest code)					M	
Project Location:	Putman Valley, NY			Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46			Severity	Probability					
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name/Title):	Hannah Bradish				Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):					Critical	E	H	H	M	L
				Marginal	H	M	M	L	L	
				Negligible	M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures for decontamination This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.				Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)						
				“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.						
				“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible						
				Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.						
				RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk						

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (HASP), steel toe work boots, high visibility safety vest, hearing protection when needed.)	Competent / Qualified Personnel: All WSP field staff with hazardous materials training Training requirements: Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA - Decontamination



Job Steps	Hazards	Controls	RAC
1. Establish Decontamination Station	1a) Materials Handling	Materials Handling - Use proper lifting techniques, lift with knees, not back, keep back straight. - Use mechanical aids, if available, to move heavy items.	L
2. Decontamination / Steam cleaning	2a) Struck by steam/hot water/pressure washing	Struck by steam/hot water - Workers not directly engaged in steam cleaning operations must stay clear. - Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. - Use face shield and safety glasses or goggles, if steam cleaning. - Stay out of the splash/steam radius. - Pressure washer must have dead man switch. - Do not direct steam at anyone. - Do not hold objects with your feet or hands. - Ensure that direction of spray minimizes spread of contaminants of concern. - Use shielding to block any equipment, property or people that cannot be removed from the work radius.	M
	2b) Exposure to contaminants	Exposure to contaminants - Conduct air monitoring (see HASP). - Wear proper PPE (see HASP). - See SDSs for hazards associated with the decon solutions used (if other than water alone us used).	L
	2c) Slips/Trips/Falls	Slips/Trips/Falls - Be cautious as ground/plastic can become slippery. - Use boots or boot covers with good traction.	L
3. Vehicle Decontamination	3a) Vehicle traffic in and out of the Contamination Reduction Zone (CRZ)	Large Vehicle Traffic - Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). - Vehicle drivers are not to exit the vehicle in the CRZ. - Identify an individual to communicate with vehicle drivers and maintain order. - Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. - If not in the vehicle, obtain eye contact with the driver so they are aware of your presence and location in the CRZ.	L

AHA - Decontamination



Job Steps	Hazards	Controls	RAC
		If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.	
	3b) Exposure to contaminants	Exposure to contaminants - Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used), hard hats, steel toe boots, and gloves while cleaning contaminated materials. - Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. - Conduct air monitoring (see HASP). - See SDSs for hazards associated with the decon solutions (if other than water alone is used).	L
	3c) Slips/Trips/Falls	Slips/Trips/Falls - Be cautious as ground/plastic can become slippery. - Use boots or boot covers with good traction.	L
4. Equipment and Sample Decontamination	4a) Chemical exposure when handling contaminated sample jars and equipment	Chemical exposure - Wear PPE as outlined in the HASP. - Refer to SDS for specific hazards associated with decon solutions. - Monitor breathing zone for contaminants. - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP).	M
	4b) Materials Handling related injuries	Materials Handling related injuries - Use proper lifting techniques when lifting heavy equipment, lift with knees, not back, keep back straight. - Use two-person lift for heavy coolers.	L
5. Personal Decontamination	4c) Exposure to contaminants	Exposure to contaminants - Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the Exclusion Zone. - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn) - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag.	M

AHA - Decontamination



Job Steps	Hazards	Controls	RAC
		▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ See SDSs for hazards associated with the decontamination solutions used. ▪ Decon solutions will be disposed of according to the work plan or related document.	

AHA – Drilling Operations Activity Description



Activity/Work Task:	Drilling Operation	Overall Risk Assessment Code (RAC) (Use highest code)	H
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix	
Contract Number:	D009809-46	Severity	Probability
Date Prepared:	7/10/2025 Date Accepted:		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist	Catastrophic	E E H H M
Reviewed by (Name/Title):		Critical	E H H M L
		Marginal	H M M L L
		Negligible	M L L L L
This AHA involves the following: Establishing site specific measures for overseeing drilling This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.		Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)	
		“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	RAC Chart
		“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	E = Extremely High Risk
			H = High Risk
			M = Moderate Risk
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.		L = Low Risk	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See site specific HASP Name – Position/Employer Training requirements: Site specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer’s instructions. Inspect all PPE prior to use Inspect rig before service

AHA – Drilling Operations Activity Description



Job Steps	Hazards	Controls	RAC
1. Drive drilling rig onto site	1A) Malfunction of vehicle/equipment	1A) Drivers shall perform a pre-operational check of equipment, read and be familiar with any operator's manual. - Report all needed repairs promptly. - Operators shall not use defective/unsafe equipment.	L
	1B) Vehicle accident while mobilizing drill rig to site	1B) Vehicle accident while mobilizing drill rig to site - All drivers shall be properly licensed. - Supervisors shall verify that drivers are capable and qualified on each type of equipment before allowing the equipment to be used unsupervised. - Keep wind shields, windshield wipers, side mirrors and side windows clean - Drivers shall conduct a pre-operation vehicle safety check - Drivers shall plan ahead to minimize or eliminate the need for backing. Always check to the rear before backing and use an observer when available. If an observer is not available, the driver shall walk around the vehicle to make sure rear is clear prior to backing. - Seat belts (if present) shall be worn when driving by driver and passengers. - Choose the safest location possible to park equipment. Avoid parking in blind spots of other equipment. - Driver is to be sure the back-up alarm is working - Adjust vehicle speed for load and weather. Tire chains should be utilized as dictated by weather conditions. - Operators should always check and be sure of load height. - When operating a vehicle off the roadway, be aware of possible hidden objects in the grass and unstable terrain. - The mast shall always be in a lowered position when moving the drill rig. - Never allow anyone between truck and trailer when backing to hook trailer - Make sure tilt beds or ramps are secured before putting trailer in use - Perform periodic checks of equipment on long trips to assure the load is secure. - Do not leave equipment unattended with the engine running. Shut off engine and set the parking brake when equipment is not in use.	L
2. Mounting and dismounting equipment	2A) Fall while mounting and dismounting equipment	2A) When mounting and dismounting equipment, use steps and handhold. Do not jump from vehicle.	L
3. Loading/unloading of equipment	3A) Crush and pinch points created when loading/unloading equipment	3A) Crush and pinch points created when loading/unloading equipment - Be aware of crushing and pinching hazards when loading, unloading and fastening down equipment. - Make sure cargo is properly loaded, secured and covered using only approved chain and load binders. Check for loose material on bed and trailer. Secure loose material. - Wear protective equipment consistent with the hazard (hard hats, safety glasses, leather gloves, safety shoes, etc.) - Hook/unhook on stable ground with the trailer secure.	L

AHA – Drilling Operations Activity Description



Job Steps	Hazards	Controls	RAC
4. Rig equipment operation.	4A) Crushing injuries, slip trips and falls, material under stress, power equipment operations, utility lines, overhead loads, flying particles, rope or cable blocks, equipment limitations, lifting and pinch points	4A) Rig equipment operation. - Before use, inspect cable, chain or wire for wear and replace if necessary. - Observe OSHA guidelines for use of cable clamps, safety latches, chains and slings. - Know rated capacity of chain, cable or wire rope being used and never exceed the rating. - Avoid overloading and sudden jerks. - Wear appropriate personal protective equipment with the hazard, including hard hats, safety glasses, leather gloves and safety shoes. - Check loads to be lifted for balance and have the rigging inspected to ensure a safe and balanced condition exists. - Do not allow employees to stand or work under suspended loads. - Awkward loads shall have taglines attached to control the load. - Review signals and operator communications with crew. Only one person shall direct the operator. - Review the area for utility lines, tree limbs and other overhead hazards. Work no closer than 10 feet to active overhead power lines. Follow OSHA guidelines. - Personnel working tag lines shall review the area for slipping, tripping and falling hazards. If not possible to eliminate the hazards, take precautions to avoid them.	M
5. Stabilize rig with hydraulic jack/pads	5A) Crushing injuries, slip, trip, fall hazards and potential back injuries.	5A) Crushing injuries, slip, trip, fall hazards and potential back injuries. - Use proper lifting techniques. - Ensure jack is rated for weight/operation with safe limits - Assure that area is clear of personnel and obstacles. - Place pads under jacks to prevent them from sinking into the ground.	M

AHA – Drilling Operations Activity Description



Job Steps	Hazards	Controls	RAC
6. Start/operate drill rig	6A) Moving machinery parts, buried and overhead utilities, drill rod stacking, lifting, winching, cathead operations, moving equipment, noise, adverse weather conditions, animals, slippery surfaces, uneven terrain, poisonous plants/snakes/insects and overhead hazards	6A) Moving machinery parts, buried and overhead utilities, drill rod stacking, lifting, winching, cathead operations, moving equipment, noise, adverse weather conditions, animals, slippery surfaces, uneven terrain, poisonous plants/snakes/insects and overhead hazards ▪ Wear appropriate personal protective equipment consistent with the hazard (hard hat, safety glasses, leather gloves, safety shoes, etc.) ▪ Avoid contact with rotating equipment ▪ When cathead is in use, assure a safe travel path for the rope by using proper techniques. Avoid standing on the rope. ▪ Observe and stay clear (minimum of 10 feet for nominal system voltage, utility lines, rated 50kV and an additional 0.4 inch for each kV over 50kV or twice the length of the line insulator, but never less than 10 feet) of overhead utility lines. - In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltage less than 50kV and 10 feet for voltages over 50kV up to and including 345kV and 16 feet for voltages up to and including 750kV. - A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. - Have underground utility lines properly located and marked prior to drilling. ▪ Employees on foot must use extreme caution to stay clear of operating equipment. Always establish eye contact with the operator before approaching the equipment. ▪ Be aware of drop-offs, uneven ground and potential hidden objects which may cause loss of control when maneuvering drill rigs or create unstable drill set-ups. In heavily wooded area, scout to locate hidden objects. ▪ Drill rod stacking must not exceed a length of 1.5 times the height of the tower. ▪ Be aware of poisonous plants, insects, snakes, animals and animal waste products and carcasses. Wear long sleeve shirts, gloves, and high top boots when hazards cannot be avoided. Proper first aid supplies, insect repellents shall accompany field crews. ▪ Be alert to conditions that can lead to slippery surfaces. Examples: high groundwater resulting in muddy soils brought to the surface by augers and the utilization of bentonite drilling fluid. ▪ Inspect all cables and clamps prior to winching operation. Stand clear of winching operations. ▪ Use proper lifting techniques. Get help or use lifting equipment. ▪ Suspend drilling operations during electrical storms ▪ Be aware of overhead hazards which may come in contact with the drill rig, when moving or setting up equipment. ▪ Complete a daily operations checklist to ensure that equipment is working properly. Make special note of emergency kill switches.	M

AHA – Drilling Operations Activity Description



Job Steps	Hazards	Controls	RAC
	6B) Contaminated soils, buried power or gas lines, landfills and containment of spills	6A) Contaminated soils, buried power or gas lines, landfills and containment of spills - During drilling operations, always be aware of the possibility of encountering potentially hazardous materials, such as petroleum hydrocarbons, herbicides, pesticides, chemical manufacturing by-products or solid waste materials. - In the event that any unknown or questionable materials are encountered, then the drilling operations are to be suspended immediately until further instructions are received from supervision. - Do not handle any suspected contaminated materials unless trained to do so and proper protective methods are followed. - During drilling operations, always be aware of the possibility of striking an unlocated or improperly located gas or power line. - In the event a buried utility line is struck, drilling operations are to be suspended immediately. - If the utility line is electric, keep personnel at least 10 feet from all metal surfaces connected with the drill rig. - If the utility is gas, then the area is to be evacuated and secured. Immediate notification to the utility company is MANDATORY. - In the event of a gas or oil spill, the proper authorities are to be contacted immediately so that containment operations can be implemented.	H
7. Attach auger to drill	7A) Auger coming loose from drill	7A) Auger coming loose from drill Insert a holding pin in auger - Insert a holding pin in auger - Use personal protective equipment such as leather gloves, safety glasses, hard hat and safety shoes. - Be aware of hand and finger positions when inserting holding pin	L
8. Start drill by lever operations	8A) Operation of wrong lever	8A) Label levers as to their operation and review equipment manual.	L
9. Maintain proper auger drill speed with down hole pressure speed.	9A) Unstable rig from improper speed of auger	9A) Use of trained drill rig personnel and follow equipment manual specification.	L
10. When auger has dug into ground unhook pin and insert another auger on top of the previous auger	10A) Auger coming loose (reference item #7)	10A) Insert another catch pin into newly installed auger (reference item #7)	L
11. Insert PVC pipe into hollow stem auger in 10 foot sections	11A) Reference Hazard item #6a	11A) Reference Control item #6A	M
12. Install filter pack (50 pound bags of sand) into hole (by pouring) to filter water into screen	12A) Back injuries, slips and falls	12A) Proper lifting procedures, team lifting and use of mechanical devices. Wear proper foot wear and maintain area in good housekeeping condition. Use approved dust masks for silica exposure.	M
13. Reverse auger after each five foot section of sand is installed	13A) Reference hazard item #4	14A) Reference Control item #4	M

AHA – Drilling Operations Activity Description



Job Steps	Hazards	Controls	RAC
14. Install Bentonite seal on top of sand (3 foot) to seal up area above sand.	14A) Reference hazard item #12	14B) Reference control item #12	M
15. Remove auger	15A) Auger falling	15A) Insert auger- maintain auger at ground surface to prevent auger from falling into hole.	M
16. Release auger tension and remove pins. Remove auger from hole.	16A) Reference hazard item #4	16A) Reference control item #4	M
17. Lower drill head attached to auger remaining in bore hole attach with a pin	17A) Reference hazard in item #4	17A) Reference control in item #4	M
18. Decontamination of drill equipment-usually pressure water	18A) Contamination of personnel and environment	18A) See AHA - Decontamination	L
19. Mix grout on site and fill/place in hole between the well pipe and bore hole wall	19A) Reference hazard item #12	19A) Reference control item #12	M
20. Cut PVC pipe off at determined height with a hand saw	20A) cutting of hand with hand saw	20A) Be aware of where hands are placed prior and during cutting with hand saw	M
21. Install a protective cover and fill with grout.	21A) Reference hazard item #12	21A) Reference control item #12	M
22. Driving drilling rig offsite.	22A) Reference item # 1	22A) Reference item #1.	M

AHA – Field Work Oversight



Activity/Work Task:	Field Work - Oversight		Overall Risk Assessment Code (RAC) (Use highest code)					M	
Project Location:	Putman Valley, NY		Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46		Severity	Probability					
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist		Catastrophic	E	E	H	H	M	
Reviewed by (Name/Title):			Critical	E	H	H	M	L	
			Marginal	H	M	M	L	L	
			Negligible	M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.			Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)						
			“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.						RAC Chart
			“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible						E = Extremely High Risk
			Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.						H = High Risk
									M = Moderate Risk
						L = Low Risk			

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See HASP Training requirements: Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer’s instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA – Field Work Oversight



Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) N/A	- Obtain and review HASP prior to site visit, if possible - Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) - Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current - Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) - First aid kits shall be available at the work site and on each transport vehicle. - Familiarize yourself with route to the site - Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions - Verify that subsurface utilities have been identified.	L
2. Traveling to the site by vehicle	2a) See JHA for Mobilization, Demobilization and Site Preparation	See JHA for Mobilization, Demobilization and Site Preparation	M
3. Initial Arrival - Assess Site Conditions	3a) Communication	- Talk to each other. Develop communication methods (agree on hand signals, warning alarms) - Log all workers and visitor on and off the site. - Let other crewmembers know when you see a hazard. - Avoid working near known hazards. - Always know the whereabouts of fellow crewmembers. - Carry a radio and spare batteries or cell phone - Hold tailgate meetings	L
	3b) Insect Bites and Stings	See AHA – Insect Stings and Bites	L
	3c) Poisonous plants	See AHA – Poisonous Plants	M
	3d) Vermin, leaches, animal borne disease	- Survey the area for dens, nests, etc. - Identify areas where biological hazards may be present. - Wear long sleeve shirt and full length pants	L
	3e) Chemical Hazards	- Wear chemical resistant PPE as identified in the HASP - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Read MSDSs for all chemicals brought to the site - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labeled	M

AHA – Field Work Oversight



	3f) Overhead Power Lines	- Identify the location of all overhead power lines at the site. - Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) - Re-locate work so it is not close to power lines - Avoid storing materials under overhead power lines	M
	3g) Underground Utilities	- All utilities will be marked prior to excavation activities - For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet - Use lineman's gloves when locating underground power lines - Work at adequate offsets from utility locations - Immediately cease work if unknown utility markings are discovered.	M
	3h) Cold Stress	- Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. - Take layers off as you heat up; put them on as you cool down. - Wear head protection that provides adequate insulation and protects the ears. - Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. - Acclimate to the cold climate to minimize discomfort. - Maintain adequate water/fluid intake to avoid dehydration. - Be aware of signs of hypothermia, its prevention, detection and treatment. - Have extra protection available, in case of an emergency such as blankets and heating devices. - Don't work under extremely adverse weather conditions - Stay in tune to current weather and extended forecasts.	L

AHA – Field Work Oversight



	3i) Heat Stress	▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.	L
	3j) Lightning and Thunder	▪ Monitor weather channels to determine if electrical storms are forecasted. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds.	L
	3k) Severe Weather	▪ Watch for clouds and incoming weather. ▪ Monitor weather forecasts. ▪ Train workers about weather and appropriate precautions. ▪ Identify a shelter and a safe place in event of tornado etc	L
	3l) Sun	▪ Keep body protected ▪ Wear sunscreen, wide brimmed hat or hardhat. ▪ Schedule work for cool part of day. ▪ Take breaks in the shade.	L
	3m) High Crime Areas	▪ Do not enter areas where threats are present. ▪ Contract security where applicable. Use the buddy system. ▪ Maintain contact with support such as radio or cell phone ▪ Do not work after dark.	L
	3n) Operations conducted at an active facility	▪ Stay well clear of operations being conducted at the facility ▪ Keep alert for moving materials, equipment or vehicles ▪ Determine client specific PPE needs prior to arriving at the site ▪ Determine client specific emergency response procedures and follow as appropriate ▪ Participate in client required safety training ▪ Get copies of Clients MSDSs for any client chemicals that workers may be exposed to. ▪ Provide MSDSs to client for all chemicals brought to the site.	M

AHA – Field Work Oversight



	3o) Remote Locations	- Carry a two-way radio and know how to use it. - Work in teams. - Make sure someone on crew is certified in first aid. - Carry a first aid kit.	M
	3p) Set up Decon Station	- Refer to MSDS for specific hazards associated with decon solutions - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn). - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Employees will wash hands, face, and any other exposed areas with soap and water. - Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. - Decon solutions will be disposed of according to the work plan.	L
4. Walk around the Site	4a) Poisonous plants	See AHA – Poisonous Plants	M
	4b) Vermin, leeches, animal borne disease	- Survey the area for dens, nests, etc. - Identify areas where biological hazards may be present. - Be aware of your surroundings. - Wear long sleeve shirt and full length pants - Wear appropriate footwear (snake boots, etc.) - Avoid high grass areas if possible - Do not put hand/arm into/under an area that you cannot see into/under clearly - Perform routine inspections for ticks, leeches, etc. of yourself and co-workers.	L
	4c) Chemical Hazards	- See HASP for appropriate level of PPE - Wear chemical resistant PPE as identified in the HASP - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Read MSDSs for all chemicals brought to the site - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labeled	L

AHA – Field Work Oversight



	4A) Slips/Trips/Falls	- Wear slip resistant footwear - Pay attention to where you place your feet - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Site SHSO will inspect the entire work area to identify and mark hazards. - Clear area of trip hazards; mark or barricade those that cannot be moved; - Use caution when walking around excavated areas - Use caution when walking on or around loose soil.	M
5. Oversight during drilling, or construction operations	5A) Heavy Equipment/Vehicles	- Spotters will be used when backing up trucks and heavy equipment and when moving equipment. - Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. - Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. - Ground personnel will not stand directly behind heavy equipment when it is in operation. - Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. Ground personnel will stay clear of all suspended loads. - Ground personnel will wear high visibility vests - Eye contact with operators will be made before approaching equipment.	M
	5B) Eye Injury	- Wear appropriate safety glasses (tinted for sun). - Watch where you walk, especially around trees and brush with protruding limbs.	L
	5C) Foot Injury	- Wear steel toed boots - Wear insulated steel toed boots during winter - Ensure shoes/boots have good traction - Pay attention to where you place your feet, especially when walking on uneven terrain	L
	5D) Head Injury	- Wear hardhat - Do not walk or work under scaffolding or other elevated work unless there are guardrails and toeboards in place - Flag or mark protruding objects at head level	L
	5E) Chemical Hazards	- Wear chemical resistant PPE as identified in the HASP - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Read MSDSs for all chemicals brought to the site - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labeled - Wash hands and face prior to consumption of food, beverage or tobacco.	M

AHA – Field Work Oversight



	5F) Dust - particulates (respiratory)	- Use dust suppression methods - Stand upwind of point of dust generation	L
	5G) Overhead Power Lines	Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.)	M
	5H) Underground Utilities	- All utilities will be marked prior to excavation activities. - Work at adequate offsets from utility locations - Immediately cease work if unknown utility markings are discovered.	M
	5I) Standing/Static Posture	- Change posture on a frequent basis - Stretch prior to any physical activity	L
	5J) Slips/ Trips/Falls	- Pay attention to where you place your feet - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Wear laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. - Clear area of trip hazards; mark or barricade those that cannot be moved. - Use caution when walking around excavated areas - Stay back at least 5 feet from excavated areas - Use caution when walking on or around loose soil. - Be aware of surroundings. Avoid muddy areas if possible.	L
6. Sampling Oversight	6A) Chemical Hazards	- See HASP for appropriate level of PPE - Wear chemical resistant PPE as identified in the HASP - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Be familiar with hazards associated with site contaminants. - Wash hands and face prior to consumption of food, beverage or tobacco. - Calibrate meters in a clean, well-ventilated area. - Store calibration gases in well vented area. Ensure chemical labels and warnings are legible.	M

AHA – Field Work Oversight



	6B) Decontamination	- Refer to MSDS for specific hazards associated with decon solutions - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn). - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Employees will wash hands, face, and any other exposed areas with soap and water. - Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. - Decon solutions will be disposed of according to the work plan.	M
	6C) Lifting	- Good lifting techniques (lift with legs not back) - Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials. - Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs) - Split heavy loads in to smaller loads - Make sure that path is clear prior to lift. - Redesign work area to avoid low lifts - Stretch prior to lifting - Maintain a healthy life style and level of physical fitness.	M
	6D) Hand Tools	- Cut resistant work gloves will be worn when dealing with sharp objects. - All hand and power tools will be maintained in safe condition. - Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. - Guards will be kept in place while using hand and power tools. - Daily inspections will be performed. - Remove broken or damaged tools from service and tag out as defective - No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) - Do not use excessive force or impact - Do not use tool improperly. Ensure all workers are trained	L

AHA – Field Work Oversight



	6E) Slips/Trips/ Falls	▪ Pay attention to where you place your feet ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. ▪ Clear area of trip hazards; mark or barricade those that cannot be moved; ▪ Use caution when walking around excavated areas ▪ Stay back at least 5 feet from excavated areas ▪ Use caution when walking on or around loose soil. ▪ Be aware of surroundings. Avoid muddy areas if possible.	L
	6F) Struck by Vehicle	▪ Ground personnel in the vicinity of vehicles operations will be within the view of the operator at all times. ▪ Ground personnel will not stand directly behind vehicles when it is in operation ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads. ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary ▪ Place cones in the front and rear of the vehicle ▪ Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. ▪ Set up "Workers in the Road" or similar warning signs and cones to alert traffic. ▪ Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. ▪ Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. ▪ Exit vehicle with caution. ▪ Wear High Visibility Vest when outside the vehicle. ▪ Utilize vehicle as a shield from oncoming traffic, as practical	L
7. IDW pickup oversight	7A) Foot Injury	▪ Wear steel toed boots ▪ Pay attention to where you place your feet, especially when walking on uneven terrain	L

AHA – Field Work Oversight



	7B) Chemical Hazards	- See HASP for appropriate level of PPE - Wear chemical resistant PPE as identified in the HASP - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Be familiar with hazards associated with site contaminants. - Wash hands and face prior to consumption of food, beverage or tobacco.	L
	7C) Lifting	- Good lifting techniques (lift with legs not back) - Use mechanical devices (e.g., hand truck, cart, forklift, etc.) to move drums. - Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs)	M
	7D) Slips/Trips/ Falls	- Pay attention to where you place your feet - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Clear area of trip hazards; mark or barricade those that cannot be moved; - Use caution when walking around excavated areas - Stay back at least 5 feet from excavated areas - Use caution when walking on or around loose soil. - Be aware of surroundings. Avoid muddy areas if possible.	L
8. Return to office/ home	8A) See Mobilization/ Demobilization and Site Preparation AHA	See Mobilization/ Demobilization and Site Preparation AHA	L

AHA - General Use of Power and Hand Tools

Activity / Task:	General Use of Power and Hand Tools	Overall Risk Assessment Code (RAC) (Use highest code)	H	
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix		
Contract Number:	D009809-46	Probability Severity		
Date Prepared:	07/10/2025			
Date Accepted:				
Prepared by:	Hannah Bradish/ Assistant Environmental Scientist			
Reviewed by: (Name, Title)				
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.		Catastrophic	E	
		Critical	E	
		Marginal	H	
		Negligible	M	
		Step 1: Review each "Hazard" to identify Probability and Severity		
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Almost Certain, Likely, Possible, Unlikely, or Rare.		RAC Chart
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible.		E = Extremely High Risk		
Step 2: Identify the RAC-Inherent (before controls are applied) as H, S, M, or L for each "Hazard" on AHA.		H = High Risk		
		M = Moderate Risk		
		L = Low Risk		

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See HASP Training requirements: Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - General Use of Power and Hand Tools

Job Steps	Hazards	Controls	RAC
1. Dusty conditions can be associated with the activities listed below	Nuisance dust (a comfort issue)	Voluntary use of dust mask is allowed subsequent to respirator awareness level training and sign off per 29 CFR 1910.134 Appendix D.	M
2. Inspect power tool(s) prior to use	Defective tool	- Know the application, limitation, and potential hazards of the tools to be used. - Verify power tool has "dead-man" switch and that it is operating properly. - Check power cords for signs of damage or wear. - Check for cracking or other damage. - Ensure bits and blades are sharp. - Check all guards to ensure that they are both attached and functioning properly. - For impact tools, check to ensure the head is not mushroomed. - For pneumatic tools, check hose connections. - For wooden handled tools, check handle for splinters, cracking, and tightness. - If tool has any deficiency, tag out of service and notify HSE Manager. Do not use tool until repaired or replaced.	L
3. Use of PPE	Multiple (see specified AHA)	- Wear standard PPE at all times. - Standard PPE includes safety glasses and safety shoes.	M
4. General power tool use	Inexperience	- All operators of power tools must be trained in their proper use and care. - Operator should never work alone until they have demonstrated operation of the tool in a safe manner. - Read owner's manual and safety precautions before operating tool.	L
	Fatigue	- Take breaks to avoid over stress and fatigue. - Switch operators if you are tired. - Stay hydrated.	L
	Lacerations, abrasions	- Unplug and de-energize power tools when changing cutting blades, bits, or attachments. - Tools must be de-energized when making any adjustments. - Secure all work, never cut while holding material in hand.	L
	Nuisance dust (a comfort issue)	Voluntary use of a filtering face piece respirator is allowed subsequent to respirator awareness level training and sign off per 29 CFR 1910.134 Appendix D.	L
	Hazardous noise	- Utilize hearing protection while operating power tools. - Read owner's manual and wear recommended hearing protection	L
	Eye Injury	- Don safety glasses with side shields or goggles while operating any power tool. - Don a face shield, over safety glasses/goggles, when using a skill saw, drill, or grinder or for any other operation which produces flying particles.	M

AHA - General Use of Power and Hand Tools

Job Steps	Hazards	Controls	RAC
(continued)	Entanglement from rotating equipment	- Do not wear gloves, jewelry, or loose-fitting clothing when operating power tools which rotate, reciprocate, or otherwise can catch on material and draw body parts in. - Long hair must be secured. - Be aware of all cords and ensure they are not in the path of motion. - Wear badge lanyards with a break away feature.	L
	Struck-by flying object	- Verify bits and blades are secured. - Remove drill chuck key before powering up.	M
	Utility damages	Before utilizing any tool verify that there are no hidden electric, gas, steam, water, communications, vacuum, or other facilities hidden behind the material you are working with.	M
	Hazardous energy	Verify hazardous energy control (LOTO) and line breaking procedures have been completed before cutting into any pipe or conduit.	M
	Dropping objects/tools	- Use Tool Tether for elevated work and barricade area below. - Where possible to contain debris, do not drop during elevated work. - Do not work above others.	H
5. General power tool use (concluded)	Fire	- Determine if a Hot Work Permit is required. Hot Work is a high-risk activity. - If a Hot Work Permit is required, the permit must be approved by an authorized person, and all designated precautions complied with before, during and after work is completed.	L
5. Electric power tools and equipment	Electrical shock	- Verify cord and plug are in good condition, free of frayed, cracked, and loose cords or broken or missing parts (such as a grounding pin if not double-insulated). - Inspect housing for any cracks or missing pieces. - Inspect tool for defective switches or safety devices. - Electric power tools must be connected to a ground fault circuit interrupter (either a fixed or a portable GFCI). - Do not operate electric power tools in the presence of water unless tool is expressly designed to operate in that environment. - When extension cords are used, the cord must be in good condition, without splices or repairs, and must be rated to carry the load. - Extension cords may not be routed through windows or doorways. - Never leave electrical appliances plugged in and unattended. - Do not handle electrical tools by the cord. - Do not disconnect by pulling wire; grasp plug and pull out of outlet. - Use only those accessories that are approved by the manufacturer. - Do not use electric cords for hoisting or lowering tools.	L
	Slip/trip/fall	- Extension cords should be elevated off the floor and secured to prevent damage to the cord. - Extension cords should not be run across walkways or in front of steps or doorways.	L

AHA - General Use of Power and Hand Tools

Job Steps	Hazards	Controls	RAC
	Hazardous noise	Read owner's manual and wear recommended hearing protection.	L
6. Gas-powered tools and equipment	Fire	- Ensure that tool is cooled down before fueling. - Utilize spark proof fuel can. - Do not start equipment within ten feet of fueling area until any residual vapor has dissipated.	L
	Carbon monoxide	- Do not use gas-powered tools indoors. - Do not use gas-powered tool in an enclosed area; ensure proper ventilation. - If operator should feel dizzy, light headed, or tired, evacuate area and get to fresh air. Ventilate work area and use CO meter to verify atmosphere before reentering.	L
	Shin/leg injury	- Wear shin guards when operating brush saw or weed eater. - Wear chaps when operating chainsaw.	L
	Vibration	Make sure anti-vibration components on tools are not missing. Wear gloves if they will not cause greater hazard to operator.	L
	Hazardous noise	Read owner's manual and wear recommended hearing protection.	L
7. Pneumatic (air-powered) tools	Laceration, eye injury	- Verify that the tool is secured to the air hose or whip by a positive means to prevent the tool from being accidentally disconnected. - Verify that all hoses exceeding 1/2-inch inside diameter have a safety device at the source of supply or branch line to reduce pressure in case of hose failure. - Safety clips or retainers for impact tools must be the proper size and securely installed and maintained. - Do not exceed the manufacturer's safe operating pressures.	L
8. Hydraulic tools	Laceration, amputation, eye injury	- Do not exceed the manufacturer's safe operating pressures for tools, hoses, pipes, filters, and fittings. - Do not use regular or impact sockets on hydraulic wrenches. - Relieve the pressure before breaking connections unless quick-acting, self-closing connectors are used. - All hoses used on or near energized electrical equipment must be made of insulated materials.	L
9. Battery-powered hand tools	Electric shock, amputation, eye injury	- Batteries shall not be left connected to tools when not in use. - Tools shall not be stored with external batteries connected.	L
10. Hand tools	Laceration, amputation, eye injury	- Each tool must only be used to perform the job for which it is intended. - Personal tool use is not recommended by WSP. If used on the job, personal tools are subject to all requirements and safe work practices. - Prior to their use, inspect hand tools for defects. Remove defective tools from service for repair or replacement. - Metal rules, metal rope lines, or other tools with metal extending through the handle are not to be used on or near energized electrical circuits or equipment.	L

AHA - General Use of Power and Hand Tools

Job Steps	Hazards	Controls	RAC
		▪ Mushroomed heads or cracks in chisels, punches, drift pins, and other impact tools must be dressed, repaired, or replaced before using. ▪ Do not use pipe or other extensions ("cheaters") to increase the leverage on wrenches. ▪ Keep edge-cutting tools sharp. ▪ When using knives or other sharp-edged cutting tools, always cut away from the body. ▪ Do not throw tools between other employees or locations. Use a tool bucket or other suitable container and hand line to raise or lower tools between elevations. ▪ When striking a chisel, punch, or wrench with a hammer, avoid hand-holding the chisel or punch. ▪ Do not strike hardened tools, such as hammers, against each other. ▪ Use diagonal or side cutters or other suitable tool to cut tie wraps. If a knife must be used, always cut away from any body part. ▪ Tools with sharp edges should have guards when stored or in transit to work locations.	
11. Saw	Kickback	▪ Use a sharp blade manufactured to cut the type of material you are working with. ▪ Support work to prevent blade from getting pinched. ▪ Cut green, treated, or wet materials slowly with caution.	L
	Cuts / lacerations	▪ Secure work to avoid getting body parts in the path of equipment. ▪ Utilize push stick to avoid getting hand or fingers in path of blade. ▪ Do not hand-hold stock when cutting with an electric saw. ▪ Do not use dull blades.	L
	Noise	▪ Read owner's manual and wear recommended hearing protection.	L
12. Drill	Torque	▪ Select correct size and type of drill for the work. ▪ Use bit designed for use with the type of material you are drilling. ▪ Use punch to provide drill bit starting point avoiding run off. ▪ Use appropriate speed for material being drilled. ▪ Do not hand-hold metal parts when drilling.	L
13. Vacuum	Inappropriate use, equipment damage	▪ Ensure correct vacuum is used for work to be performed. ▪ Verify vacuum is assembled for the application (e.g., filters installed if required). [Note: All company vacuums are identified/marked as either a wet vac (i.e., without particulate filters) or a dry vac. Care must be exercised to select the correct type of vac for the activity conducted.]	L
14. Sander	Lacerations, dust/particle buildup	▪ Guard all nip points. ▪ Contain or collect dust eliminating buildup.	L
15. Bench or pedestal grinder	Struck-by projectile	▪ Inspect and ring test grinding stone before use. Check for cracks, chips, and defects and remove from service if deficient. ▪ Adjust tongue guard within ¼" of the wheel and the work rest within 1/8" of the wheel.	L

AHA - General Use of Power and Hand Tools

Job Steps	Hazards	Controls	RAC
		- Stand to side of wheel until it gets up to speed to prevent injury from projectiles should wheel fail upon startup. - Maintain light pressure. Too much pressure on a cold wheel can cause failure.	
	Fire, burns	- Remove any flammable or combustible materials from vicinity of work. Cover those that cannot be moved with a fireproof blanket. - Wear gloves and long sleeves that are tight fitting and do not interfere with rotation of grinder if spark shower should rain down upon your arms and hands.	L
16. Hand-held angle grinder	Laceration or struck-by	- Side handle must be attached and used to maintain control of the tool. - Face shield is required during use. - Hand-held grinders or other abrasive wheel tools shall never be clamped into a vice for use.	L
17. Cutting, drilling, or breaking concrete	Respirable silica	- Use engineering and work practice controls to reduce and maintain employee exposure to respirable crystalline silica to below the OSHA PEL. - Refer to Table 1 in 29 CFR 1926.1153 for specific exposure controls when working with materials containing silica and follow the specified control measures. - For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust. - For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust. - Perform housekeeping using wet methods or HEPA-filtered vacuuming. Dry sweeping is not permitted. - Use of compressed air for cleaning clothing or surfaces is not permitted. - A competent person will make frequent inspections of the job site to verify that the written exposure control plan is complied with.	M
18. Use of powder-actuated tools	Explosion, laceration, eye injury	- Do not operate a powder-actuated tool unless you are trained and qualified for the operation of the particular tool to be used. - Tools must be tested each day before loading (in accordance with the manufacturer's recommended procedure) to ensure safety devices are in proper working condition. - Do not load tools until just prior to the intended firing time. Never point a loaded or empty tool at any person. Keep hands clear of the open barrel end. - Loaded tools must not be left unattended. - Do not use tools in an explosive or flammable atmosphere. - Use the correct shield, guard, or attachment recommended by the manufacturer when using the tool.	L

AHA - General Utility Knife Use

Activity / Task:	General Utility Knife Use	Overall RAC for AHA:	M
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix	
Contract Number:	D009809-46	Probability Severity	Frequent
Date of Analysis / Update:	07/10/2025 Date Accepted:		Likely
Prepared by:	Hannah Bradish/ Assistant Environmental Scientist	Occasional	Seldom
Reviewed by: (Name, Title)		Unlikely	
		Catastrophic	E
		Critical	E
		Marginal	H
		Negligible	M
		Methodology for RAC Designations	
This AHA involves the following: - Establishing site specific measures - This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	
		RAC Chart	
		E = Extremely High Risk	
		H = High Risk	
		M = Moderate Risk	
		L = Low Risk	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See HASP Training requirements: Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	- Visually inspect knife before and after use. Tag and take out of service any broken or defective utility knife. - Inspect PPE before use.

AHA - General Utility Knife Use

Job Steps	Hazards	Controls	RAC-Residual
1. Use of PPE	Multiple (see specified AHA)	- Wear standard PPE at all times. - Standard PPE includes safety glasses and safety shoes.	M
2. Obtain utility knife from storage location	Improper equipment, cutting hazard	- Only use retractable-safe utility knives. - All personnel must receive training on proper use of retractable-safe utility knives. - Check your utility knife to ensure it is in proper working condition prior to use.	M
3. Position parcel or box on stable surface	Ergonomic hazards, falling objects, slips/trips	- Be careful while moving box to avoid slips/trips. - Do not stack the box or parcel to be opened on unstable surfaces for the cutting /opening operation.	L
4. Open package	Sharp objects, cut hazard, twisting/bending, damage to package contents	- Watch for metal staples used to secure parcels or boxes to avoid breaking blade and/or cutting hand/fingers. - Ensure fingers and other body parts are clear from cutting path. - Avoid repetitive bending, lifting, and twisting with boxes or parcels. - Wear cut-resistant gloves if opening numerous packages. - Be careful when cutting to ensure that package contents are not damaged by knife blade. - Verify blade is retracted when not in use.	M
5. Return utility knife to storage location	Nonfunctional equipment	Check knife to ensure it is in proper working condition before returning it to its storage location.	L

AHA – Insect Stings and Bites



Activity/Work Task:	Insect Stings and Bites			Substantial / High Risks:	Lyme Disease, Rocky Mountain Spotted Fever, etc.; Allergic reactions, painful stings		Highest RAC: (residual)	M		
Project Location:	Putman Valley, NY			Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46			Probability Severity	Almost certain	Likely	Possible	Unlikely	Rare	
Date Prepared:	07/10/2025	Date Accepted:								
Prepared by (Name/Title):	Hannah Bradish/Assistant Environmental Scientist			Catastrophic	H	H	S	S	M	
Reviewed by (Name/Title):				Critical	H	S	S	M	L	
				Marginal	S	M	M	L	L	
				Negligible	M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: - Establishing site specific measures for the specified activity BOLD hazards corresponding to Substantial or High Risk. This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the project HASP or client information for additional requirements, and emergency procedures. Workers to follow general site safety controls for Hazard Signage/PPE, Housekeeping, Slips Trips and Falls, Biological hazards, Mobile equipment, Confined spaces, Fall hazards, Electrical, and any active operating equipment or construction activities.				Step 1: Review each “Hazard” to identify Probability and Severity (Refer to Project HSE Risk Characterization Form) “Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Almost certain, Likely, Possible, Unlikely, Rare. “Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal or Negligible					Risk Categories	
				Step 2: Identify the RAC-Inherent as H, S, M, or L for each “Hazard” on AHA, before controls are applied.					H = High Risk	
				Step 3: Identify the RAC-Residual as H, S, M, or L for each “Hazard” on AHA, after controls are applied.					S = Substantial Risk	
				Step 4: Annotate the overall highest RAC-Residual at the top of AHA.					M = Moderate Risk	
									L = Low Risk	

AHA – Insect Stings and Bites



Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: • Work uniform or work clothes • Safety glasses • Steel-toed boots • Gloves (per HASP) • High-visibility reflective vests	Competent / Qualified Personnel: Name: WSP Staff, refer to HASP. Training Requirements: • HAZWOPER (40-hour, 8-hour Refresher, Supervisory, if applicable) • Site-Specific HASP Orientation • Toolbox safety meeting • Task kick-off meeting	• Daily inspection of equipment per manufacturer's instructions. • Inspect all PPE prior to use.

Job Steps	Hazards	RAC Inherent	Controls	RAC Residual
1. Traveling/working in areas with potential tick bites (ex. outdoor wooded areas or fields)	1A) Lyme Disease, Rocky Mountain Spotted Fever, etc.	S	• Spray clothing with insect repellant as a barrier. • Wear light colored clothing that fits tightly at the wrists, ankles, and waist. • Each outer garment should overlap the one above it. • Cover trouser legs with high socks or boots. • Tuck in shirt tails. • Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for the first couple of hours. • If a tick becomes attached, pull it by grasping it as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal. • Do not try to remove the tick by burning with a match or covering it with chemical agents. • If you cannot remove the tick, or the head detaches, seek prompt medical help. • Watch for warning signs of illness: a large red spot on the bite area, fever, chills, headache, joint and muscle ache, significant fatigue, and facial paralysis are reactions that may	M

AHA – Insect Stings and Bites



Job Steps	Hazards	RAC Inherent	Controls	RAC Residual
			appear within two weeks of the attack. Symptoms specific to Lyme disease include: confusion, short-term memory loss, and disorientation.	
2. Working/traveling in areas with potential bee and wasp stings (ex. wooded areas and fields)	2A) Allergic reactions, painful stings	S	• Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. • Prior to approaching protective well casings, observe for any indication of nesting activity. • If you or anyone you are working with is known to have allergic reactions to bee stings, tell the rest of the crew and your supervisor. Make sure you carry emergency medication with you at all times. • Wear long sleeve shirts and trousers; tuck in shirt. Bright colors and metal objects may attract bees. • If you are stung, cold compresses may bring relief. • If a stinger is left behind, scrape it off the skin. Do not use tweezers as this squeezes the venom sack, worsening the injury. • If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. Give victim antihistamine, (Benadryl, chlo-amine tabs).	L
3. Traveling/working in areas of potential mosquito bites (ex. woods, fields, near bodies of water, etc.)	3A) Skin irritation, encephalitis	M	• Wear long sleeves and trousers. • Avoid heavy scents. • Use insect repellants. If using DEET, do not apply directly to skin, apply to clothing only. • Carry after-bite medication to reduce skin irritation.	L

AHA – Mobilization/Demobilization and Site Preparation



Activity/Work Task:	Mobilization/Demobilization and Site Preparation	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix	
Contract Number:	D009809-46	Severity	Probability
Date Prepared:	07/10/2025 Date Accepted:		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title):	Hannah Bradish	Catastrophic	E E H H M
Reviewed by (Name/Title):		Critical	E H H M L
		Marginal	H M M L L
		Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site-specific measures for mobilization and demobilization to/from the general site area and specific sampling locations This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.		Step 1: Review each “ Hazard ” with identified safety “ Controls ” and determine RAC (See above) “Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. “Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA. RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk	

Job Steps	Hazards	Controls	RAC
1. Prepare for Site Visit	1a) N/A	Prior to leaving for site: - Obtain and review HASP prior to site visit, if possible - Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel-toed boots) - Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current - Complete site-specific/client-required training, if applicable - Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) - Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions. - Familiarize yourself with route to the site	L

AHA – Mobilization/Demobilization and Site Preparation



Job Steps	Hazards	Controls	RAC
	1b) Vehicle defects	Inspect company owned/leased vehicle for defects such as: - Flat tires - Windshield wipers worn or torn - Oil puddles under vehicle - Headlights, brake lights, turn signals not working	L
	1c) Insufficient emergency equipment, unsecured loads	Insufficient emergency equipment, unsecured loads: - Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) - Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work - Cell phones are recommended to call for help in the event of an emergency - Vehicles carrying tools must have a safety cage in place. All tools must be properly secured. - Vehicles must be equipped with chocks if the vehicle is to be left running, unattended - Ensure sufficient gasoline is in the tank	M
2. Operating vehicles	2a) Collisions, unsafe driving conditions	Drive Defensively!: - Seat belts must be used at all times when operating any vehicle on company business. - Drive at safe speed for road conditions - Maintain adequate following distance - Pull over and stop if you have to look at a map - Try to park so that you don't have to back up to leave. - If backing is required, walk around vehicle to identify any hazards (especially low-level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	M
3. Driving to the jobsite (mobilization)	3a) Dusty, winding, narrow roads	Dusty, winding, narrow roads - Drive confidently and defensively at all times. - Go slow around corners, occasionally clearing the windshield.	M
	3b) Rocky or one-lane roads	Rocky or one-lane roads: - Stay clear of gullies and trenches, drive slowly over rocks. - Yield right-of-way to oncoming vehicles---find a safe place to pull over.	M
	3c) Stormy weather, near confused tourists	Stormy weather, near confused tourists: - Inquire about conditions before leaving the office. - Be aware of oncoming storms. - Drive to avoid accident situations created by the mistakes of others.	M

AHA – Mobilization/Demobilization and Site Preparation



Job Steps	Hazards	Controls	RAC
	3d) When angry or irritated	When angry or irritated: ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	L
	3e) Turning around on narrow roads	Turning around on narrow roads: ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.	M
	3f) Sick or medicated	Sick or medicated: ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	M
	3g) On wet or slimy roads	On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.	M
	3h) Animals on road	Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas.	M
4. Gain permission to enter site	4a) Hostile landowner, livestock, pets	Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic. ▪ Ensure all animals have been secured away from work area.	M
5. Mobilization/ Demobilization of Equipment and Supplies	5a) Struck by Heavy Equipment/Vehicles	Struck by heavy equipment: ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.	M
	5b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	M

AHA – Mobilization/Demobilization and Site Preparation



Job Steps	Hazards	Controls	RAC
	5c) Overexertion Unloading/Loading Supplies	Overexertion Unloading/Loading Supplies: - Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. - Tightly secure all loads to the truck bed to avoid load shifting while in transit.	M
	5d) Caught in/on/between	Caught in/on/between: Do not place yourself between two vehicles or between a vehicle and a fixed object.	M
	5e) Slip/Trip/Fall	Slip/Trip/Fall: - Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. - Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. - Drivers will check surface before stepping, not jumping down.	M
	5f) Vehicle accident	Vehicle accident: Employees should follow WSP vehicle operation policy and be aware of all stationary and mobile vehicles.	M
6. Site Preparation	6a) Slip/Trip/Fall	Slip/Trip/Fall: Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas.	M
7. Driving back from the jobsite	7c) See hazards listed under item #3	See safe work practices under item #3	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves, steel toe work boots, high visibility safety vest)	Competent / Qualified Personnel: All WSP project field staff Training requirements: List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Field Work - Poisonous Plants



Activity/Work Task:	Field Work – Poisonous Plants			Overall Risk Assessment Code (RAC) (Use highest code)					L	
Project Location:	Putman Valley, NY			Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46			Severity	Probability					
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely	
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist			Catastrophic	E	E	H	H	M	
Reviewed by (Name/Title):				Critical	E	H	H	M	L	
				Marginal	H	M	M	L	L	
				Negligible	M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures for field work with potential for poisonous plants. This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements.				Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)						
				“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.						RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk
				“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible						
				Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.						

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, gauntlets, steel toe work boots, high visibility safety vest) IvyX lotion (or similar product for precontact) Soap and Water after contact (Technu or similar product)	Competent / Qualified Personnel: All WSP Employees Training requirements: Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Inspect all PPE prior to use. Decontaminate all tools and clothing to avoid contact with residual oils.

AHA - Field Work - Poisonous Plants



Job Steps	Hazards	Controls	RAC
1. Mobilization	1a) See AHA – Mobilization/Demobilization and Site Preparation	See AHA - Mobilization, Demobilization and Site Preparation	L
2. Preparation	2a) Training – Identifying Poisonous Plants	Provide training on identifying the specific poisonous plants that could be present at the site	L
		   POISON IVY <i>(Rhus toxicodendron L.)</i> POISON OAK <i>(Rhus diversiloba)</i> POISON SUMAC <i>(Rhus toxicodendron vernix)</i>	L

	2b) Poison Ivy 	Poison Ivy: ▪ Grows everywhere in United States except Hawaii and Alaska. ▪ In the Eastern, Midwestern, and the Southern United States it grows as a vine. ▪ In the Northern and Western United States it grows as a shrub. ▪ Each leaf has three leaflets. ▪ Leaves are green in the summer and red in the fall. ▪ In the late summer and fall, white berries may grow from the stems.	L

AHA - Field Work - Poisonous Plants



	2c) Poison Oak  A photograph of Poison Oak leaves, which are green and have a fuzzy texture. Below the photo is a map of the United States with red outlines indicating the distribution of Poison Oak in the Eastern and Western regions. Poison Oak: ▪ Oak-like fuzzy leaves in clusters of three. ▪ It has two distinct kinds: ▪ Eastern poison oak (New Jersey to Texas) grows as a low shrub. ▪ Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long. ▪ It may have clusters of yellow berries.	L
	2d) Poison Sumac  A photograph of Poison Sumac flowers, which are small, white, and clustered together. Below the photo is a map of the United States with red outlines indicating the distribution of Poison Sumac in the Northeast and Midwest regions. Poison Sumac ▪ Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast. ▪ Each leaf has clusters of seven to 13 smooth-edged leaflets. ▪ The plants can grow up to 15 feet tall. ▪ The leaves are orange in spring, green in summer, and red, orange or yellow in fall. ▪ There may be clumps of pale yellow or cream-colored berries.	L

AHA - Field Work - Poisonous Plants



3. Contact with poisonous plants	3a) Hand Contact	Hand Contact ▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch. ▪ Leather Gloves must be worn at all times when digging, screening or carrying field equipment. ▪ Leather gloves should be of sufficient length to cover the entire wrist and cuff of the shirt. ▪ Carefully remove gloves, without touching the exterior surface, when taking notes and prior to lunch or restroom breaks. ▪ Gloves that become worn should be replaced immediately. ▪ Do not scratch or rub the face or other exposed skin while wearing gloves ▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.	M
	3b) Arm Contact	Arm Contact ▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch ▪ Wear light weight, long sleeved shirts as the sleeves will provide a physical barrier between the skin and any urushiol oil encountered. Disposable gauntlets may be worn over arms to keep oil from clothing as well. ▪ Have the sleeves pulled down to the base of the hand, covering the forearm and wrist (all exposed skin). ▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.	M

AHA - Field Work - Poisonous Plants



	3c) Leg Contact	Leg Contact ▪ Wear long pants and boots. ▪ Assume boots are contaminated with the urushiol oil and only handle with gloved hands.	M
4. Handling Contaminated Equipment and Clothing	4a) Exposure from Handling Contaminated Equipment	Exposure from Handling Contaminated Equipment ▪ Do not handle any field equipment that may have come in contact with poison ivy/oak/sumac without gloves ▪ Decontaminate all equipment at the end of each workday with a solution of water and dish soap. ▪ Scrub all surfaces of the screens and shovels with a brush. ▪ Rinse with cool water using a portable garden sprayer.	M
	4b) Exposure from Handling Contaminated Clothing	Exposure from Handling Contaminated Clothing ▪ Wash clothing potentially contaminated with urushiol oil prior to wearing again. ▪ Handle contaminated clothing with gloves as the oil can remain on environmental surfaces for up to 5 years.	M

AHA - Soil Sampling



Activity/Work Task:	Soil Sampling			Overall Risk Assessment Code (RAC) (Use highest code)					H
Project Location:	Putman Valley, NY			Risk Assessment Code (RAC) Matrix					
Contract Number:	D009809-46			Severity	Probability				
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist			Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):				Critical	E	H	H	M	L
				Marginal	H	M	M	L	L
				Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.				Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
				"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk
				"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					
				Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: All WSP Employees Training requirements: List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Soil Sampling

Job Steps	Hazards	Controls	RAC
1. Prepare for sampling event	1a) Chemical exposure	Chemical Exposure Read HASP and determine air monitoring and PPE needs.	M
2. Carrying equipment to site location	2a) Back or muscle strain	Back or muscle strain - Use proper lifting techniques when lifting pumps or generators, lift with knees, keep back straight. - Use mechanical aids if available - Use 2 person lift for heavy items	M
3. Calibrate monitoring equipment	3a) Exposure to calibration gases	Exposure to calibration gases - Review equipment manuals - Calibrate in a clean, well ventilated area	L
4. Preparing sampling location	4a) Contact with poisonous plants or the oil from poisonous plants	Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Wear PPE as described in the HASP. - Do not touch anything part of your body/clothing. - Always wash gloves before removing them. - Discard PPE in accordance with the HASP.	L
	4b) Contact with biting insects (i.e., spiders, bees, etc.)	Contact with stinging/biting insects - Discuss the types of insects expected at the Site and be able to identify them. - Look for signs of insects in and around the well. - Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." - If necessary, wear protective netting over your head/face. - Avoid contact with the insects if possible. - Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. - Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.	L
	4c) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated soil); flammable atmospheres.	Exposure to hazardous substances - Wear PPE as identified in HASP. - Review hazardous properties of site contaminants with workers before sampling operations begin - Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. - When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.	L
	4d) Back strain due to lifting or moving equipment to sampling locations	Back strain - Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. - Use proper lifting techniques, lift with knees, not back, keep back straight.	M

AHA - Soil Sampling



Job Steps	Hazards	Controls	RAC
	4e) Foot injuries from dropped equipment	Foot Injuries - Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. - Do not carry more than you can handle safely - Wear steel toed boots	M
5. Collecting soil samples	5a) Working around drill rigs	See AHA - Drilling	M
	5b) Encountering underground or overhead utilities	Have all utilities located.	H
	5c) Fire/Explosion/Contamination hazard from refueling generators	Fire/Explosion/Contamination hazard from refueling generators - Turn the generator off and let it cool down before refueling - Segregate fuel and other hydrocarbons from samples to minimize contamination potential - Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited - See JHA for Gasoline use	M
	5d) Electrocution	Electrocution - A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. - Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. - Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water - Do not stand in wet areas while operating power equipment - Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. - When unplugging a cord, pull on the plug rather than the cord. - Never do repairs on electrical equipment unless you are both authorized and qualified to do so.	M
	5e) Exposure to contaminants	Exposure to Contaminants - Stand up wind when sampling - Monitor breathing zone with appropriate monitoring equipment (see HASP) - Wear chemical resistant PPE as identified in HASP - See section 4C) under Safe Practices above	L
	5f) Exposure to preservatives	Exposure to preservatives - Work in a well ventilated area, upwind of samples - Wear chemical resistant PPE as identified in HASP - Review MSDSs	M
	5g) Slips/trips/falls	Slips/trips/falls - Ground can become wet/muddy - Wear good slip resistant footwear	L

AHA - Soil Sampling



Job Steps	Hazards	Controls	RAC
	5h) Lifting Injury	Lifting injury - Use proper lifting techniques when carrying quantities of samples - Use proper ergonomics when hand digging for samples	M
	5i) Eye injury	Eye Injury Wear eye protection when using picks or similar devices to loosen soil	M
	5j) Fire	Fire - When using gas powered auger, maintain fire watch whenever fueling or otherwise handling gasoline - See JHA - Gasoline	L
6. Soil sampling using floor corer	6a) Back injury	Back Injury - Use proper lifting techniques when moving floor corer and generator - Use mechanical aids if available - Use two person lift for heavy items.	M
	6b) Electric Shock	Electric Shock - Use electric cords free from defects - Keep cords out of water - Ensure all electrical equipment is properly grounded - Use GFCI	M
	6c) Hearing	Hearing Wear hearing protection	L
	6d) Fire	Fire - When using generator, maintain fire watch whenever refueling or otherwise handling gasoline - See JHA - Gasoline	M
	6e) Contamination	Contamination - Use appropriate PPE for the contaminants of concern (see HASP). - Minimize sample contact - Label sample in accordance with procedures - Monitor breathing zone levels.	L

AHA - Surface Water Sampling Activity Description



Activity/Work Task:	Surface Water Sampling	Overall Risk Assessment Code (RAC) (Use highest code)	L		
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix			
Contract Number:	D009809-46	Severity	Probability		
Date Prepared:	07/10/2025 Date Accepted:		Frequent Likely Occasional Seldom Unlikely		
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist		Catastrophic E E H H M		
Reviewed by (Name/Title):			Critical E H H M L		
			Marginal H M M L L		
		Negligible M L L L L			
This AHA involves the following: Establishing site specific measures for surface water sampling on site This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.		Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;"> “Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. “Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA. </td> <td style="width: 30%; text-align: center; vertical-align: middle;"> RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk </td> </tr> </table>		“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. “Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.	RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk
“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. “Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.	RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk				
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements			
PPE: safety glasses, gloves, steel toe work boots, PFD, high visibility vest	Competent / Qualified Personnel: See site specific HASP (Name – Position/Employer) Training requirements: HAZCOM Site Specific HASP Orientation Tailgate safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer’s instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use			

AHA - Surface Water Sampling Activity Description



Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) General site hazards	1A) Familiarize self with site prior to visit. - Complete appropriate training before going on site. - Provide appropriate person in district office your itinerary. - Prepare listing of emergency phone numbers, both on and offsite. - Identify site/activity PPE needs. - Ensure that First Aid training is current, and that tetanus booster are current.	L
2. Check and calibrate sampling equipment.	2A) Muscle strain - lifting, twisting, tugging	2A) Muscle strain - lifting, twisting, tugging - Inspect all PPE and equipment and ensure that it is working properly. - Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)	L
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls - Wear proper footwear. - Pay attention to where walking.	L
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls Survey and clear the pathway. See AHA for Clearing Brush, Weeds, and Trees	L
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging - Proper lifting, ergonomic practices and body mechanics. - Share the load, move items in smaller shifts, or use cart.	L
	3C) Irrate property owners, pets	3C) Irrate property owners, pets - Call property owners in advance. - Check in to introduce yourself upon arrival. - Be courteous and diplomatic	L
	3D) Crime	3D) Crime - Do not enter areas where threats are present. - Contract security where applicable. - Use the buddy system. - Maintain contact with support such as radio or cell phone.	L
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. - Wear orange/yellow safety vest - Use buddy system. - Use traffic cones and a lookout. - Attempt to sample away from the bridge if possible	L

AHA - Surface Water Sampling Activity Description



Job Steps	Hazards	Controls	RAC
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over water.	L
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.	L
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. ▪ If leg gets caught, use slight back and forth motion to soften mud and remove slowly. Don't try to pull leg out with twisting or jerking motion. ▪ If possible, aerate or bubble the mud to help relieve suction.	L
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See AHA for Insects, Stings and Bites ▪ See AHA for Dog – Wildlife Safety.	L

AHA - Surface Water Sampling Activity Description



Job Steps	Hazards	Controls	RAC
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: ○ Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: ○ Keep body protected ○ Wear sunscreen, wide brimmed hat or hardhat. ○ Drink plenty of fluids to remain hydrated. ○ Schedule work for cool part of day. ○ Take breaks in the shade. ▪ Wind: ○ Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: ○ During cold weather - layer clothing and wear wind impervious outerwear ○ During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.	L
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.	L
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.	L
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash. ▪ Change filter prior to sedimentation back pressure.	L
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.	L
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.	L

AHA - Surface Water Sampling Activity Description



Job Steps	Hazards	Controls	RAC
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.	L
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)	L
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.	L
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.	L
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.	L
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See AHA for Vehicle Travel – Journey Management Plan	L

AHA – Utility Clearance Activities



Activity/Work Task:	Utility Clearance Activities		Overall Risk Assessment Code (RAC) (Use highest code)				H	
Project Location:	Putman Valley, NY		Risk Assessment Code (RAC) Matrix					
Contract Number:	D009809-46		Severity	Probability				
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist		Catastrophic	E	E	H	H	M
			Critical	E	H	H	M	L
Reviewed by (Name/Title):			Marginal	H	M	M	L	L
			Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.			Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)					
			“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk
			“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					
			Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.					

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (1/2 face respirator with P-100 cartridge, Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See HASP Training requirements: Site Specific HASP Orientation Tailgate safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer’s instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA – Utility Clearance Activities



Job Steps	Hazards	Controls	RAC
1. Pre-planning	1a) Property Access - Animal bites - Dangerous social areas/ violent neighborhoods - Lost - Electrocution	Ensure communications with the property owner. Request pets and animals to be confined during the survey. - Maintain communications via two way radios or cell phones. - Learn animal posturing including how to identify rabid animals. - Contract security as appropriate for safety and equipment theft. - Be prepared with a map and compass as necessary. - Be aware of overhead and underground utilities. Ensure Dig-Safe has been contacted. - When working with electrical equipment avoid wet surfaces and exposed connections.	L
	1b) Utilities Not Cleared (damage to utilities, worker injury)	Utilities Not Cleared. - Provide sufficient time and budget to ensure that utilities have been adequately located, prior to the start of up of work. - Contact One Call Utility identifier organization at least 6 days prior to the project start date. - Cite or have subcontractor cite a start date of at least 3 working days prior to actual planned start date (provides window to inspect locations prior to job start-up). - Verify via emails or phone that all utilities have visited the site and marked their respective utilities. - If subcontractor calls One Call organization, require them to forward all e-mail responses from member utilities as they receive them. - If verification cannot be done remotely, send worker to site to inspect ground for markings (cheaper to identify issues prior to mobilization to the site). - Document all phone communications with driller about utility clearance issues and requests (e-mail the conversation highlights or document in a field notebook – it becomes part of the file record) - Call any member utilities that have not responded indicating they have cleared or marked-out utilities. Place the call morning of ticket start date (e.g., 3 days prior to actual start date). Document the phone conversations in notes or e-mails to the file. - If town services (e.g., sanitary sewer, storm sewer, water) aren't listed as a One Call member, contact the town office to schedule mark-out, obtain copies of utility networks, and identify the appropriate town contacts. - If town maps have lateral connections to private lots marked and /or if we are drilling along road right-of way opposite developed properties, identify the locations of the lateral connections. This may mean contacting abutters and asking to look in basements for location of pipes. If possible do this during a site visit prior to field start. If not, it should occur during the first day of work so any issues can be identified and decisions made on the risk of proceeding. Walk all planned locations with the subcontractor, prior to start of excavation/drilling to identify marked utilities and note any uncertainties. Field Lead should call PM and relay any issues. Document this inspection in the field book and note subcontractor's responses to any MACTEC concerns.	H

AHA – Utility Clearance Activities



	1c) Locating Utilities on Private Property	Locating Utilities on Private Property - Hire private utility locator company - Locate underground utilities by ground penetrating radar, electromagnetic, deep metal detector, pipe transmitter, vibracator, etc - Review locations with property owner, member of operations and maintenance. - Check as built drawings when available. Be aware possible drawing error or construction drawings may not be representative of actual locations. - Use field clues such as manhole covers, repaved areas, depressions, disturbed areas, signs and postings, etc. as indications of access to utilities or recently installed/moved utilities.	M
	1d) Lack of Reliable Data on Utility Locations	Lack of Reliable Data on Utility Locations - If the surveys are not providing reliable data, plan to use non-destructive means to drill/excavate e.g., soil vacuum, water jet, air knife and/or hand tools. - Use caution and proper PPE when using hand tools (hand augers, posthole diggers, shovels, steel rods, etc.). 1) Involve the Project Manager, Technical Lead and/or Office Manager to make a decision to proceed or move the location	L
	1e) Working Near Live Utilities	Working Near Live Utilities - If live utilities are known to be present near drilling/excavation location, if possible, move drilling/excavation to another location. - Lockout/Tagout utilities, if possible. Use non-destructive means to drill/excavate (see # 1d) until safe to proceed.	H
	1f) Slips/Trips/Falls	Slips/Trips/Falls - Keep work area free of excess material and debris - Remove all trip hazards by keeping materials/objects organized and out of walkways - Keep work surfaces dry when possible - Wear appropriate PPE (see HASP) including non-slip rubber boots if working on wet or slick surfaces - Install rough work surface covers where possible - Stay aware of footing and do not run	L
	1g) Heat/Cold Stress	Heat/Cold Stress - Take breaks if feeling faint or overexerted - Consume adequate food/beverages (water, sports drinks) - If possible, adjust work schedule to avoid temperature extremes	L
2. Walking Around Site Identifying Utility Clearances.	2a) Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Biological Hazards: Insects, Snakes, Wildlife, Vegetation - Inspect work areas when arrive at site to identify hazard(s) - Use insect repellant if observe mosquitoes/gnats - Survey site for presence of biological hazards and maintain safe distance - Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions	M

AHA – Utility Clearance Activities



	2b) Traffic (including pedestrian)	Traffic (including pedestrian) ▪ Notify attendant or site owner/manager of work activities and location ▪ Use cones, signs, flags or other traffic control devices ▪ Wear appropriate PPE including high visibility clothing such as reflective vest ▪ Inspect area behind vehicle prior to backing and use spotter	M
	2c) Back strain due to lifting, pulling or tugging equipment	Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques	M

AHA - Vehicle Travel – Journey Management Plan



Activity/Work Task:	Vehicle Travel – Journey Management Plan	Overall Risk Assessment Code (RAC-Residual) Use highest code:	H														
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix															
Contract Number:	D009809-46	Probability Severity	Almost certain	Likely	Possible	Unlikely	Rare										
Date Prepared:	07/10/2025 Date Accepted:		Catastrophic	E	E	E	H	M									
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist		Major	E	H	H	M	L									
Reviewed by (Name/Title):			Serious	H	H	M	L	VL									
			Minor	M	M	L	L	VL									
		Negligible	L	VL	VL	VL	VL										
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures for driving a car or truck to or from the site. This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the project HASP or client information for additional requirements, and emergency procedures. Workers to follow general site safety controls for Hazard Signage/PPE, Housekeeping, Slips Trips and Falls, Biological hazards, Mobile equipment, Confined spaces, Fall hazards, Electrical, and any active operating equipment or construction activities.		Step 1: Review each “Hazard” to identify Probability and Severity (Refer to Risk Register) <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Almost certain, Likely, Possible, Unlikely, Rare.</td> <td style="background-color: #800000; color: white; text-align: center;">E = Extremely High Risk</td> </tr> <tr> <td>“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Major, Serious, Minor or Negligible</td> <td style="background-color: #ff0000; color: white; text-align: center;">H = High Risk</td> </tr> <tr> <td>Step 2: Identify the RAC-Inherent as E, H, M, L or VL for each “Hazard” on AHA, before controls are applied.</td> <td style="background-color: #ff0000; color: white; text-align: center;">M = Moderate Risk</td> </tr> <tr> <td>Step 3: Identify the RAC-Residual as E, H, M, L or VL for each “Hazard” on AHA, after controls are applied.</td> <td style="background-color: #ffff00; color: black; text-align: center;">L = Low Risk</td> </tr> <tr> <td>Step 4: Annotate the overall highest RAC-Residual at the top of AHA.</td> <td style="background-color: #90ee90; color: black; text-align: center;">VL = Very Low Risk</td> </tr> </table>						“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Almost certain, Likely, Possible, Unlikely, Rare.	E = Extremely High Risk	“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Major, Serious, Minor or Negligible	H = High Risk	Step 2: Identify the RAC-Inherent as E, H, M, L or VL for each “Hazard” on AHA, before controls are applied.	M = Moderate Risk	Step 3: Identify the RAC-Residual as E, H, M, L or VL for each “Hazard” on AHA, after controls are applied.	L = Low Risk	Step 4: Annotate the overall highest RAC-Residual at the top of AHA.	VL = Very Low Risk
“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Almost certain, Likely, Possible, Unlikely, Rare.	E = Extremely High Risk																
“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Major, Serious, Minor or Negligible	H = High Risk																
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Step 3: Identify the RAC-Residual as E, H, M, L or VL for each “Hazard” on AHA, after controls are applied.	L = Low Risk																
Step 4: Annotate the overall highest RAC-Residual at the top of AHA.	VL = Very Low Risk																
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)		Inspection Requirements														
Safe Vehicle	Competent / Qualified Personnel: See HASP Training requirements: Current Driver’s license		Daily inspection of equipment per manufacturer’s instructions.														

**AHA - Vehicle Travel –
Journey Management Plan**



Job Steps	Hazards	RAC Inherent	Controls	RAC Residual

AHA - Vehicle Travel – Journey Management Plan



1. Prepare for travel	Distractions - loss of focus	VL	▪ Ensure you have all materials with you necessary to conduct work effort. ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current. ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment). ▪ Determine if trip is considered Non-Routine: ○ Driving on business makes up <50% of the driver's daily job; ○ The route is variable and not part of the driver's daily or weekly drive plan; ○ Trips during darkness in excess of 20 miles (32 km); ○ Environmental or visibility hazards require a reduction in vehicle operating speed; ○ The terrain could reasonably be anticipated to impact the shifting of loads and/or require the use of 4-wheel drive; and ○ Security concerns warrant higher level of caution. ▪ If non-routine, complete a Journey Management Plan ▪ Plan route. Adjust based on driving conditions. Consider: ○ Communications ○ Other MACTEC vehicles on same route ("convoy") ○ Emergency plans ○ Meeting point(s) ○ Fuel / food / rest points ○ Review rules and procedures (driving, remote work, lone worker) ○ Other ▪ If renting vehicle, select best vehicle type for road and travel conditions (e.g., AWD or 4WD if snow/ice, larger vehicle if wildlife encounters are a possibility, etc. ▪ Evaluate weather conditions prior to starting trip. Postpone trip if possible, If travel during bad weather required, adjust route to avoid backroads as much as possible. ▪ Ensure that a copy of the current insurance certificates and incident reporting procedures/forms are available during travel. ▪ If long trip, notify others of your estimated arrival time so they can follow up if you don't arrive on time.	VL

AHA - Vehicle Travel – Journey Management Plan



	Driver Fatigue	H	▪ Get plenty of rest prior to starting trip. ▪ Consider Wood policy on driving and work (duty) hours limitations when planning trip: ○ Maximum driving time between breaks – 4.5 hours followed by 30 minute break ○ Maximum duty hours within a rolling 24-hour period – 14 duty hours ○ Maximum driving hours within a single rolling 24-hour period – 10 hours total, excluding commuting time (11 hours including commuting time) ○ Off duty period in a rolling 7-day period - Minimum of a continuous 24 hour break ▪ Comply with the Jurisdictional P&O Work-Week Schedule Procedures and do not exceed the legislated maximum hours of work, rest periods, and/or Agency Approvals for excess hours of work for the specific activity/project. ▪ Comply with the E&IS HSE Fatigue Management Procedures (CAN: HSE-PRO-100387, US Fatigue Management Procedure HSE-PRO-100xxx). ▪ Consider alternatives (e.g., other modes of transportation such as by air, staying over at site location an extra day, breaking up trip by staying at hotel at halfway point, etc.). ▪ Avoid driving after dark.	VL
	Vehicle defects	L	Inspect vehicle for defects such as: ▪ Inadequate fluids (e.g., fuel, antifreeze, oil, windshield washer) ▪ Worn/flat tires ▪ Windshield wipers loose, worn, or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working ▪ Exterior or interior damage (e.g., scratches, dents)	M
	Insufficient emergency equipment, unsecured loads	M	▪ Ensure vehicle has first aid kit and that all contents are current (if first aid kits are not provided at the site). ▪ Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work. ▪ Cell phones are recommended to call for help in the event of an emergency. ▪ Vehicles carrying tools must have a safety cage in place; all tools must be properly secured. ▪ Valuables shall be removed from the vehicle overnight if possible. ▪ Ensure parking cones are present, if applicable.	L

AHA - Vehicle Travel – Journey Management Plan



1. Operating vehicles	Collisions, unsafe driving conditions	H	▪ Drive defensively! ▪ Each operator shall observe all traffic laws, including established speed limits. ▪ Do not use cruise control during inclement (wet/icy) road conditions. ▪ Do not eat or use tobacco products (e.g. smoking or e-cigarettes) in the vehicle. ▪ Avoid any distracting or potentially distracting activities while operating a vehicle, including but not limited to: the use of any device that requires the use of headphones; reaching for items under the seat, in the back seat or in the glove box. ▪ Pets are prohibited to ride in a company vehicle. ▪ Non-E&IS employees are prohibited from operating Company vehicles. ▪ Non-E&IS employees are prohibited from riding in E&IS vehicles unless their presence is required for the conduct of business for E&IS or its client; nonwork riders (e.g., hitch hikers, girl friend, mother-in-law) allowed in vehicles, unless authorized on a case-by-case basis. ▪ Seat belts must be used at all times by all occupants when the vehicle is in gear. ▪ Drive at safe speed <u>for road conditions</u>. ▪ Maintain adequate following distance. ▪ Pull over and stop if you have to look at a map or use a cell phone. ▪ Cellular telephones are prohibited from use by the operator while driving or even when stopped at stop lights, including texting, emailing, and including the use of Bluetooth devices or car microphone/speakers. ▪ Mount global positioning satellite (GPS) navigating devices within the vehicle as to not obstruct the driver's view of the roadway and attached so that it will not injure any of the vehicle's occupants in the event of a sudden stop. Window mounting of navigation devices is prohibited. ▪ The use of GPS-enabled smartphones is allowed as long as the device is mounted, directions setup prior to driving, has an audio feature, is not adjusted while driving. ▪ Try to park so that you don't have to back up to leave. ▪ If backing is required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	L

AHA - Vehicle Travel – Journey Management Plan



2. Operating vehicles 3. Parking	Intersections	H	- Proceed carefully through intersections. - Ensure that cross traffic has stopped before proceeding, especially if the light has just turned green. Look out for drivers running red lights! - When merging into traffic or turning, ensure vehicles in front have merged/turned (and not stopped) prior to proceeding.	M
	Dusty, winding, narrow roads	H	Go slow around corners, occasionally clearing the windshield.	M
	Rocky or one-lane roads	H	- Stay clear of gullies and trenches, drive slowly over rocks. Yield right-of-way to oncoming vehicles---find a safe place to pull over.	M
	Stormy weather	H	- Inquire about conditions before leaving the office. - Be aware of oncoming storms.	M
	When angry or irritated	H	Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	M
	Turning around on narrow roads	H	- Safely turn out with as much room as possible. - Know what is ahead and behind the vehicle. - Use a spotter if available.	M
	Sick or medicated	H	- Let others on the crew know you do not feel well. - Let someone else drive.	M
	On wet or slick roads	H	Drive slow and safe.	L
	Animals on road	H	- Drive slowly, watch for other animals nearby. - Be alert for animals darting out of wooded areas	M
	Vehicle accident	H	Employees should follow Wood E&IS vehicle operation policy and be aware of all stationary and mobile vehicles.	H
	Striking other vehicles, objects	H	- Choose parking spot that is away from other vehicles, if possible. - Choose a spot that will allow the driver to drive forward when leaving the site. - Back into parking spots, or pull through when parking in perpendicular parking spaces (drive forward into angle/herring bone type parking spots). - The vehicle gear must be placed in park and parking brakes engaged, when required. - When two or more occupants are in a Company vehicle, one occupant will act as a spotter and safely stand outside the vehicle, to guide the vehicle into and out of a parking spot to ensure it does not hit another vehicle, pedestrian, barrier or any other object.	H

AHA - Vehicle Travel – Journey Management Plan



4. Leaving parking spaces	Striking other vehicles, objects	H	- Walk around the vehicle before leaving and identify hazards (low-lying objects, location of other vehicles or pedestrians, other vehicles with drivers that may be leaving at the same time, etc. - If backing is unavoidable, use a spotter if a second person is available; if no spotter available, back slowly, checking for other vehicles, pedestrians, etc. - Keep alert!	M
5. Driving back from the job site	See hazards listed for “Operating vehicles” Key Work Step	H	See safe work practices for “Operating vehicles” Key Work Step	M
6. Parking at office	Striking other vehicles, objects	H	See safe work practices for “Striking other vehicles, objects” Hazard/Potential Hazard for “Parking at job site” Key Work Step.	M
7. End travel	Vehicle defects	H	- Inspect vehicle. - Repair or initiate repair of all vehicle deficiencies that occurred due to the trip.	M

**AHA - Vehicle Travel –
Journey Management Plan**



FIELD ACKNOWLEDGEMENT OF PERSON(S) CARRYING OUT WORK

NAME(S):	SIGNED:	DATE:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SITE SUPERVISOR:	SIGNED:	DATE:
_____	_____	_____

Note: For tasks/activities that extend beyond a single day, use attached DAILY RENEWAL form or FLRA.

AHA - Vehicle Travel – Journey Management Plan



AHA DAILY RENEWAL		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		
Date:	Weather:	
Changes noted:		
Site Supervisor (Print & Sign):		
Name(s):		

AHA – Drilling and Soil/Groundwater Sampling



Activity/Work Task:	Drilling and Soil/Groundwater Sampling		Overall Risk Assessment Code (RAC) (Use highest code)				L		
Project Location:	Putman Valley, NY		Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46		Severity	Probability					
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist			Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):				Critical	E	H	H	M	L
				Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L		
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. All site personnel to follow this AHA and general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.			Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)						
			“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart		
			“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk		
			Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk		
							M = Moderate Risk		
				L = Low Risk					

AHA – Drilling and Soil/Groundwater Sampling



Job Steps	Hazards	Controls	RAC
1. Drilling wells / Oversight, Soil logging	Entanglement in rotating equipment	Safety guards, loose fitting clothes and long hair, and jewelry prohibited. Stay clear of rotating augers and pinch points. Know location of kill switch.	L
	Toe and pinch hazards	Use long handled shovels to remove cuttings from auger. Do not leave rods or augers leaning, balancing or unsecured on the rig.	
	Drill rig moving or tipping	Chock wheels of equipment, set parking brake. Never use equipment on unstable or unsafe inclines. Use hand signals and line-of-sight communication with operators.	
	Electrocution /fire	Locate all underground power lines. Do not work within 10 feet of high voltage electrical equipment. Leave at least 20 feet between drilling masts and overhead power lines. Lower masts before moving rig. Never work when there is a threat of lightning.	
	Splashing or projectile material	Wear hard had, safety glasses, and long sleeves when near drill rig.	

AHA – Drilling and Soil/Groundwater Sampling



2. Drilling with Direct Push Technology	Noise Electrocution Toe and pinch hazards Rig moving or tipping Splashing or projectile material Ergonomic Stress	Wear hearing protection when near equipment in operation. Locate all underground power lines. Do not work within 10 feet of high voltage electrical equipment. Leave at least 20 feet between drilling masts and overhead power lines. Lower masts before moving rig. Never work when there is a threat of lightning. Do not leave rods or augers leaning, balancing or unsecured on the rig. Chock wheels of equipment, set parking brake. Never use equipment on unstable or unsafe inclines. Use hand signals and line-of-sight communication with operators. Wear hard hat, safety glasses, and long sleeves when near rig. Lift (sample cooler) carefully with load close to body with the legs taking most of the weight. Seek assistance with lifts greater than 40 lbs. Keep legs under the load and do not overreach or twist to the side.	L

AHA – Drilling and Soil/Groundwater Sampling



3. Soil, groundwater, and sediment sampling	Ergonomic Stress Slips, trips, and falls Calibration gas exposure Chemical exposure Pinch Hazard	Lift carefully with load close to body with the legs taking most of the weight. Seek assistance with lifts greater than 40 lbs. Keep legs under the load and do not overreach or twist to the side. Clear work area of obstructions and debris before setting up. Continually inspect work areas for slip, trip, and fall hazards. Backfill holes, or eliminate them by identifying them clearly with caution tape or barricades. Store loose for light material and debris in designated areas or containers. Secure tools, materials, and equipment subject to displacement or falling. Wear appropriate PPE, review user manuals, follow OSHA guidance for compressed cylinders. Wear appropriate PPE, decontaminate sampling equipment, practice good personal hygiene. Keep fingers clear of manhole or sewer covers when removing for sample collection.	L

AHA – Drilling and Soil/Groundwater Sampling



Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Drill rig, augers, vehicle, GPS, map of well locations, field notebook, pens, PPE, Direct Push / rig, tubing &, liners, field knife, PID, map of boring locations, cell phone, jars, tools, terra-cores, shovel, groundwater sampling set-up, calibration gas	Competent / Qualified Personnel: Training requirements: List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Geoprobe Investigation – Oversight and Sample Collection ONLY



Activity/Work Task:	Geoprobe Investigation – Oversight and Sample Collection ONLY		Overall Risk Assessment Code (RAC) (Use highest code)				M		
Project Location:	Putman Valley, NY		Risk Assessment Code (RAC) Matrix						
Contract Number:	D009809-46		Severity	Probability					
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist			Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):				Critical	E	H	H	M	L
			Marginal	H	M	M	L	L	
			Negligible	M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: - Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.			Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)						
			“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.						RAC Chart
			“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible						E = Extremely High Risk
									H = High Risk
			Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.						M = Moderate Risk
						L = Low Risk			

AHA - Geoprobe Investigation – Oversight and Sample Collection ONLY



Job Steps	Hazards	Controls	RAC
1. Subcontractor Drive Geoprobe onto site	1A) Malfunction of vehicle/equipment	1A) Drivers shall perform a pre-operational check of equipment, read and be familiar with any operator's manual. - Report all needed repairs promptly. - Operators shall not use defective/unsafe equipment.	L
	1B) Wreck of Geoprobe while being driven	1B) Wreck of Geoprobe while being driven - All drivers shall be properly licensed. - Supervisors shall verify that drivers are capable and qualified on each type of equipment before allowing the equipment to be used unsupervised. - Keep wind shields, windshield wipers, side mirrors and side windows clean - Drivers shall conduct a pre-operation vehicle safety check - Drivers shall plan ahead to minimize or eliminate the need for backing. Always check to the rear before backing and use an observer when available. If an observer is not available, the driver shall walk around the vehicle to make sure rear is clear prior to backing. - Seat belts shall be worn when driving by driver and passengers. - Choose the safest location possible to park equipment. Avoid parking in blind spots of other equipment. - Adjust vehicle speed for load and weather. Tire chains should be utilized as dictated by weather conditions. - When operating a vehicle off the roadway, be aware of possible hidden objects in the grass and unstable terrain. - Never allow anyone between truck and trailer when backing to hook trailer - Perform periodic checks of equipment on long trips to assure the load is secure. - Do not leave equipment unattended with the engine running. Shut off engine and set the parking brake when equipment is not in use.	L
2. Loading/unloading of equipment	2A) Crush and pinch points created when loading/unloading equipment 2B) Heavy lifting, twisting, bending 2C) Slip, trips and falls	2A) Crush and pinch points created when loading/unloading equipment - Be aware of crushing and pinching hazards when loading, unloading and fastening down equipment. - Make sure cargo is properly loaded and secured. - Wear protective equipment consistent with the hazard (hard hats, safety glasses, leather gloves, safety shoes, etc.) 2B) Size up the load, utilize help for heavy items, split loads as necessary. Use proper body mechanics and ergonomic techniques. 2C) Keep walking area clear. Proper housekeeping.	M

AHA - Geoprobe Investigation – Oversight and Sample Collection ONLY



3. Geoprobe operation by Subcontractor	3A) Vehicle movement/ unstable 3B) Crushing injuries, pinch points, entanglement and flying particles, 3C) Noise 3D) slip trips and falls, 3E) material under stress, equipment limitations, rope or cable blocks, hydraulic leaks 3F) utility lines, 3G) overhead loads, 3H) lifting 3I) Chemical exposure	Geoprobe operation by the Subcontractor. Read Owner's Manual. 3A) Always apply the parking brake and shut off engine before exiting the vehicle. • Ensure back up alarm is operational. • Complete a visual inspection of the equipment prior to operation. Replace or repair equipment if necessary. Complete a checklist to document inspections and corrective actions required. • Keep body parts clear of probe foot. • Be familiar with Emergency kill switch and controls. Test prior to probing. • When on sloped surface position the unit parallel to the slope with the control on the up hill side. • Use caution on soft or loose surface. Be aware of the weight of loaded vehicle. • Be aware of weather and windy conditions. Do not operate during lightning storm or high winds. 3B) Heed all Caution, Warning or Danger decals on machine. • Ensure everyone is clear of moving parts. • Designate only one experienced operator to avoid unexpected engagement. • Operate only from the control side. Do not reach across operating probe. • Avoid placing your hands on top of the tool string when raising/lowering the hammer or swinging/ folding probe assembly. • DO not wear loose clothing. Tie back hair when operating equipment. • PPE – safety shoes, hard hat, safety glasses, hearing protection, gloves. Optional Tyvek or coveralls. 3C) PPE – hearing protection. 3D) Maintain an orderly and clean site. • Housekeeping. • Barricade or establish work zones to minimize unauthorized entry. • Adequate lighting 3E) Know the capacities, equipment limitations and acceptable operating loads. Follow the equipment operator's manual and proper maintenance requirements. • Stand clear of potential release of energy. Keep body part clear of moving parts. • Use the correct tool for the job. • Limit the rate of the hammer lowering while advancing the tool string to avoid raising the probe foot more than 6 inches off the ground surface. • In the event problem or binding, the operator should release all control levers to neutral. • Inspect hydraulic lines. Repair or replace damaged hoses. 3F) Be aware of surroundings. Establish safe "dig" zones. Contact Dig Safe or "one call" system to mark underground utilities or tanks. • Before moving onto a site, evaluate height restrictions due to overhead utilities and vegetation. • Borings to be located a minimum of 10 feet from overhead lines. • Do not drive the machine with the mast extended.	M

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		3G) Remain alert. Establish work zone to minimize workers under overhead loads. Avoid sudden jerks or overloading. Check load for balance and appropriate support prior to hoisting. 3H) Use mechanical means to lift heavy loads and removing rod. Don appropriate PPE for chemicals of concern. Work from upwind. Be aware of combustion fumes if equipment has auxiliary power. Practice good hygiene by washing hands, and no eating/smoking within the exclusion zone.	L
4. Operational area	4A) adverse weather conditions (temperature extremes), 4B) uneven terrain, 4C) poisonous plants/snakes/insects hazards	4A) Keep a weather eye. Monitor the weather forecast and actual conditions. - Wear appropriate clothing that does not restrict, cause over heat or is too loose. - Be aware of muddy conditions or puddles. 4B) Be aware of drop-offs, uneven ground and potential hidden objects which may cause loss of control when maneuvering rigs or create unstable drill set-ups. In heavily wooded area, scout to locate hidden objects. Use care when walking. 4C) Be aware of poisonous plants, insects, snakes, animals and animal waste products and carcasses. Wear long sleeve shirts, gloves, and high top boots when hazards cannot be avoided. Proper first aid supplies, insect repellents shall accompany field crews.	M
	4D) Contaminated soils, buried power or gas lines, landfills and containment of spills	4D) Contaminated soils, buried power or gas lines, landfills and containment of spills - During drilling operations, always be aware of the possibility of encountering potentially hazardous materials, such as petroleum hydrocarbons, herbicides, pesticides, chemical manufacturing by-products or solid waste materials. - In the event that any unknown or questionable materials are encountered, then the drilling operations are to be suspended immediately until further instructions are received from supervision. - Do not handle any suspected contaminated materials unless trained to do so and proper protective methods are followed. - During drilling operations, always be aware of the possibility of striking an un-located or improperly located gas or power line. - In the event a buried utility line is struck, drilling operations are to be suspended immediately. - If the utility line is electric, keep personnel at least 10 feet from all metal surfaces connected with the drill rig. - If the utility is gas, then the area is to be evacuated and secured. Immediate notification to the utility company is MANDATORY. - In the event of a gas or oil spill, the proper authorities are to be contacted immediately so that containment operations can be implemented.	M
5. Subcontractor Mixing grout on site and filling/placing in hole between the well pipe and bore hole wall	5A) Lifting 5B) Chemical exposure	5A) Size the load of materials to be moved and utilize appropriate help for lifting and moving. Use proper ergonomic and body mechanics to move materials (bags of grout, etc.). Use mechanical mixer for large quantities of grout. 5B) PPE – Safety glasses, safety shoes, gloves, optional tyvek/coveralls.	M
6. Subcontractor cutting soil acetate sleeve open to sample soil	6A) cutting of hand with a razor blade	6A) MACTEC personnel must let the subcontractor cut the sample liners as they have the appropriate tools to do so. 6B) Subcontractor must be aware of where hands are placed prior and during cutting with hand saw	M
7. Subcontractor driving drilling rig offsite.	7A) Reference item # 1	7A) Reference item #1.	M

AHA - Geoprobe Investigation – Oversight and Sample Collection ONLY



Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: Name – Position/Employer Training requirements: List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Groundwater Sampling Activity Description



Activity/Work Task:	Groundwater Sampling	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location:	Putman Valley, NY	Risk Assessment Code (RAC) Matrix					
Contract Number:	D009809-46	Severity	Probability				
Date Prepared:	07/10/2025		Date Accepted:				
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist		Frequent	Likely			
Reviewed by (Name/Title):			Occasional	Seldom			
			Unlikely				
		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.) This AHA involves the following: Establishing site specific measures This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					
		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection (See project specific HASP))	Competent / Qualified Personnel: See HASP Training requirements: HAZCOM Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA - Groundwater Sampling Activity Description



Job Steps	Hazards	Controls	RAC
1. Mobilization	1a) See AHA - Mobilization/Demobilization and Site Preparation	See AHA - Mobilization/Demobilization/Site Preparation	M
2. General Site Hazards	2a) See AHA - Field Work - General	See AHA - Field Work - General	L
	2b) Chemical exposure	Chemical Exposure Read HASP TO determine air monitoring and PPE needs.	M
3. Calibrate monitoring equipment	3a) Exposure to calibration gases	Exposure to calibration gases - Review equipment manuals - Calibrate in a clean, well ventilated area	L
4. Opening the well cap, taking water level readings	4a) Contact with poisonous plants or the oil from poisonous plants	Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. - Wear PPE as described in the HASP. - Do not touch any part of your body/clothing. - Always wash gloves before removing them. - Discard PPE in accordance with the HASP. - Use commercially available products such as Ivy Block or Ivy Wash as appropriate.	M
	4b) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	Contact with stinging/biting insects - Discuss the types of insects expected at the Site and be able to identify them. - Look for signs of insects in and around the well. - Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." - If necessary, wear protective netting over your head/face. - Avoid contact with the insects if possible. - Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. - Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.	M

AHA - Groundwater Sampling Activity Description



	4c) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	Exposure to hazardous substances - Wear PPE as identified in HASP. - Review hazardous properties of site contaminants with workers before sampling operations begin - Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP - Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. - When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.	M
	4d) Back strain due to lifting bailers or pumps and from moving equipment to well locations	Back strain - Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. - Use proper lifting techniques	L
	4e) Foot injuries from dropped equipment	Foot Injuries - Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. - Do not carry more than you can handle safely - Wear Steel toed boots	L
5. Collecting water samples	5a) Fire/Explosion/Contamination hazard from refueling generators	Fire/Explosion/Contamination hazard from refueling generators - Turn the generator off and let it cool down before refueling - Segregate fuel and other hydrocarbons from samples to minimize contamination potential - Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited - See AHA for Gasoline use	L
	5b) Electrocution	Electrocution - A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. - Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. - Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water - Do not stand in wet areas while operating power equipment - Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. - When unplugging a cord, pull on the plug rather than the cord. - Never do repairs on electrical equipment unless you are both authorized and qualified to do so.	L

AHA - Groundwater Sampling Activity Description



	5c) Exposure to contaminants	Exposure to Contaminants - Stand up wind when sampling - Monitor breathing zone with appropriate monitoring equipment (see HASP) - Wear chemical resistant PPE as identified in HASP - See section 4C) under Safe Practices above	M
	5d) Infectious water born diseases	Infectious water born diseases - Wear chemical resistant gloves and other PPE – as identified in HASP - Prevent water from contacting skin - Wash exposed skin with soap and water ASAP after sampling event - Ensure that all equipment is adequately decontaminated using a 10% bleach solution	L
	5e) Exposure to water preservatives	Exposure to water preservatives - Work in a well ventilated area, upwind of samples - Wear chemical resistant PPE as identified in HASP - When preserving samples always add acid to water, avoid the opposite. - See Working With Preservatives JHA	M
	5f) Slips/trips/falls	Slips/trips/falls - Ground can become wet/muddy, created by spilled water - Place all purged water in drums for removal - Wear good slip resistant footwear	M
	5g) Repetitive Motion and other Ergonomic Issues	Ergonomic Issues - Use mechanical means where possible to raise and lower equipment into well. - Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. - Use safe lifting techniques.	L
6. Sample Processing	6a) Contaminated water	Contaminated water - Wear appropriate PPE as identified in HASP - Decontaminate outside of bottles - Prevent water from contacting skin - Work in well ventilated area – upwind of samples - Waste will be returned to the operation office for storage and disposal	M
7. Shipping Samples	7a) Freeze burns, back strain, hazardous chemical exposure, sample leakage	Freeze burns, back strain, hazardous chemical exposure, sample leakage. - Wear appropriate chemical resistant gloves as identified in HASP. - Wear leather or insulated gloves when handling dry ice. - Follow safe lifting techniques – get help lifting heavy coolers. - Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.	M

AHA - Field Work - General



Activity/Work Task:	Field Work - General			Overall Risk Assessment Code (RAC) (Use highest code)					L
Project Location:	Putman Valley, NY			Risk Assessment Code (RAC) Matrix					
Contract Number:	D009809-46			Severity	Probability				
Date Prepared:	07/10/2025	Date Accepted:			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Hannah Bradish/ Assistant Environmental Scientist			Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):				Critical	E	H	H	M	L
				Marginal	H	M	M	L	L
				Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)				Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
This AHA involves the following:				"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					RAC Chart
Establishing site specific measures for general field work.				"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					E = Extremely High Risk
This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.				Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					H = High Risk
									M = Moderate Risk
									L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	Competent / Qualified Personnel: See HASP Training requirements: List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag defective tools and remove from service. Inspect equipment prior to use. Inspect all PPE prior to use

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
1. Prepare For Site Visit	N/A	- Obtain and review HASP prior to site visit. - Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots). - Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current. - Complete site specific/ client required training. - Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment). - First aid kits shall be available at the work site and on each transport vehicle. - Familiarize yourself with route to the site. - Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions. - Verify that subsurface utilities have been identified.	L
2. Traveling To The Site By Vehicle		See AHA - Mobilization, Demobilization and Site Preparation	L
3. Initial Site Condition Assessment And Walking Around The Site	3a) Poor Communication – General Safety	Poor Communication – General Safety - Develop communication methods (agree on hand signals, warning alarms) with subcontractor and other site personnel. - Log all workers and visitor on and off the site. - Let other crewmembers know when you see a hazard. - Avoid working near known hazards. - Always know the whereabouts of fellow crewmembers. - Carry a radio and spare batteries or cell phone at all times. - Hold and document Safety Tailgate Meetings. - Establish and communicate work zones, evacuation routes and rally locations.	L
	3b) Insect, Scorpion and Animal Bites And Stings	Insect, Scorpion And Animal Bites And Stings See - AHA Insect Stings and Bites	L
	3c) Poisonous Plants	Poisonous Plants See – AHA Poisonous Plants	L
	3d) Chemical Hazards	Chemical Hazards - See HASP for appropriate level of PPE. - Use monitoring equipment, as outlined in HASP, to monitor breathing zone. - Read SDSs for all chemicals brought to the site. - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labelled. - Decon thoroughly prior to consumption of food, beverages, or tobacco.	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
	3e) High Crime Areas	High Crime Areas - Do not enter areas where threats are present. - Contract security where applicable. Use the buddy system. - Maintain contact with support such as radio or cell phone. - Do not work after dark.	L
	3f) Operations Conducted at an Active Facility	Operations Conducted at an Active Facility - Stay well clear of operations being conducted at the facility. - Keep alert for moving materials, equipment or vehicles. - Determine client specific PPE needs prior to arriving at the site. - Determine client specific emergency response procedures and follow as appropriate. - Participate in client required safety training. - Get copies of Clients SDSs for any client chemicals that workers may be exposed to. - Provide SDSs to client for all chemicals brought to the site.	L
	3g) Remote Locations	Remote Locations - Carry a two-way radio or cell phone with clear signal and know how to use it. - Work in teams. Account for all at the end of the work day. - Make sure someone on crew is certified in first aid. - Carry a first aid kit.	L
	3h) Personnel Decontamination	Personnel Decontamination See AHA - Decontamination.	L
	3i) Slips / Trips / Falls	Slips / Trips / Falls - Site SHSO will inspect the entire work area to identify and mark hazards. - Clear area of trip hazards; mark or barricade those that cannot be moved. - Horseplay is strictly prohibited. - Wear slip resistant footwear preferably laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. - Pay attention to where you place your feet. Be aware of surroundings. Avoid muddy areas if possible. - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Slow down and use extra caution around logs, rocks, and animal holes. - Stay back at least 5 feet from excavated areas. Use caution when walking on or around loose soil.	L
	3j) Head Injury	Head Injury - Identify all overhead hazards prior to commencing work operations. - Personnel are required to wear hard hats that meet ANSI Standard Z89.1.	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
		- All ground personnel will stay clear of suspended loads. - All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. - Do not walk or work under scaffolding or other elevated work unless there are guardrails and toe boards in place. - Flag or mark protruding objects at head level. - Inspect rigging prior to each use. - Do not walk under trees in high winds.	
	3k) Eye Injury	Eye Injury - Wear appropriate safety glasses (tinted for sun and UV protection). - Watch where you walk, especially around trees and brush with protruding limbs.	L
	3l) Foot Injury	Foot Injury - Employees must wear steel toe boots meeting ANSI Standard Z41-1999: Personal Protection - Protective Footwear, or ASTM F2412-2005: Standard Test Methods for Foot Protection, or ASTM F2413-2005. - Wear extra socks or insulated steel toed boots during winter when cold. - Ensure shoes/boots have good traction.	L
4. Oversight During Drilling, Or Construction Operations	4a) Caught In /On / Between Moving Equipment	Caught In /On / Between Moving Equipment - Clear area of obstructions and communicate with all workers involved that drilling is beginning. - Wear appropriate PPE including leather gloves and steel-toed boots (See HASP). - Workers will not position themselves between equipment and a stationary object. - Workers will not wear long hair down (place in pony-tail and tuck into shirt), jewelry or loose clothing if working with tools/machinery.	L
	4b) Eye Injury	Eye Injury See Section 3k above	L
	4c) Foot Injury	Foot Injury See Section 3l above	L
	4d) Head Injury	Head Injury See Section 3j above	L
	4e) Chemical Hazards	Chemical Hazards See Section 3d above	L
	4f) Dust - Particulates (Respiratory)	Dust - Particulates (Respiratory) - Use dust suppression methods. - Stand upwind of point of dust generation.	L
	4g) Slips / Trips / Falls, Twisted Ankles and Knees	Slips / Trips / Falls, Twisted Ankles and Knees See Section 3i above	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
	4h) Operations Conducted at an Active Facility	Operations Conducted at an Active Facility See Section 3f above	L
	4i) Injury from Heavy Equipment or Vehicles	Injury from Heavy Equipment or Vehicles - Ground personnel will wear high visibility vests. - All equipment will be equipped with backup alarms. Spotters will be used when backing up trucks and heavy equipment and when moving equipment. - Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. - Ground personnel will make eye contact with operators before approaching equipment. Operator will acknowledge eye contact by removing his hands from the controls. - Equipment will not be approached on blind sides. Ground personnel will not stand directly behind heavy equipment when it is in operation. - Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. - Ground personnel will stay clear of all suspended loads. - Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. - Try to park so that you don't have to back up to leave. If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary. - Place cones in the front and rear of the vehicle if near moving equipment or vehicles. Set up "Workers in the Road" or similar warning signs and cones to alert traffic. - Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. - Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. - Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. Exit vehicle with caution.	L
	4j) Underground Utilities	Underground Utilities - All utilities will be marked prior to excavation activities. - For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet. - Use lineman's gloves when locating underground power lines. - Work at adequate offsets from utility locations.	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
		Immediately cease work if unknown utility markings are discovered.	
	4k) Back Injuries	Back Injuries - Lifting - Good lifting techniques (lift with legs not back). - Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. - Team lifting should be utilized if mechanical devices are not available (mandatory for items over 50 lbs). - Split heavy loads in to smaller loads. - Make sure that path is clear prior to lift. - Redesign work area to avoid low lifts. - Stretch prior to lifting. - Maintain a healthy life style and level of physical fitness.	L
		Back Injuries - Shoveling - Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material. - Inspect the handle for splinters and/or cracks. - Ensure that the blade is securely attached to the handle. - Stand with your feet about hip width for balance and keep the shovel close to your body. - Bend from the knees (not the back) and tighten your stomach muscles as you lift. - Avoid twisting movements. If you need to move the snow to one side reposition your feet to face the direction the snow will be going. - Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted. - Pace yourself to avoid getting out of breath and becoming fatigued too soon. - Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.	L
		Back Injuries - Standing/Static Posture - Change posture on a frequent basis. - Stretch prior to any physical activity.	L
	4l) Overhead Power Lines	Overhead Power Lines - Identify the location of all overhead power lines at the site. - Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) - Re-locate work so it is not close to power lines. - Avoid storing materials under overhead power lines.	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
	4m) Noise	Noise - Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). - All equipment will be equipped with manufacturer's required mufflers. - Hearing protection shall be worn by all personnel working in or near heavy equipment. - Hearing protection will be worn when workers need to shout when standing two feet away from each other. - Segregate noisy equipment from the operators. - Use sound dampening around noisy equipment.	L
5. Sampling and Sampling Oversight	5a) Chemical Hazards	Chemical Hazards - See Section 3d above - Calibrate meters in a clean, well ventilated area. - Store calibration gases in well vented area. Ensure chemical labels and warnings are legible.	L
	5b) Decontamination	Decontamination See AHA - Decontamination	L
	5c) Back Injury - Lifting	Back Injury - Lifting See Section 4K above	L
	5d) Hand Injury from Use of Hand Tools	Hand Injury from Use of Hand Tools - Cut resistant work gloves will be worn when dealing with sharp objects. - All hand and power tools will be maintained in safe condition. - Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. - Ensure guards are in place and are in good condition. - Daily inspections will be performed. - Remove broken or damaged tools from service and tag out as defective. - No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.). - Do not use excessive force or impact. - Use tool in accordance with manufacturers instructions and for its intended purpose. Ensure all workers are trained. - No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.).	L
	5e) Slips/Trips/Falls	Slips/Trips/Falls See Section 3I above.	L
	5f) Caught In / On / Between	Caught In / On / Between	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
		See Section 4A above	
	5g) Contact With Electricity	Contact With Electricity - All electrical tools and equipment will be equipped with GFCI. - Electrical extension cords will be of the “Hard” or “Extra Hard” service type. - All extension cords shall have a three-blade grounding plug. - Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. - Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. - All electrical work will be conducted by a licensed electrician. - All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may exposed workers to electrical, mechanical, hydraulic, etc. hazards. - All utilities will be marked prior to excavation activities. - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and a minimum of 35 feet from all others.)	L
	5h) Equipment Failure	Equipment Failure All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.	L
	5i) Fire Protection	Fire Protection - Ensure that adequate number and type of fire extinguishers are present at the site. - Inspect fire extinguishers on a monthly basis – document tag on each extinguisher. - All employees who are expected to use fire exinguishers will have received training on an annual basis. - Obey no-smoking policy. - Open fires are prohibited. - Maintain good housekeeping. Keep rubbish and combustibles to a minimum. - Keep flammable liquids in small containers with lids closed or a safety can.	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
		When dispensing flammable liquids, do in well vented area and bond and ground containers.	
	5j) Confined Space Entry	Confined Space Entry Confined Space Entry is not included in this project. Contact Chad Barnes before entering any confined space.	L
6. IDW pickup oversight	6a) Foot Injury	Foot Injury See Section 3l above.	L
	6b) Chemical Hazards	Chemical Hazards See Section 3d above.	L
	6c) Back Injury - Lifting	Back Injury - Lifting See Section 4k above.	L
	6d) Slips/Trips/Falls	Slips/Trips/Falls See Section 3i above	L
7. Environmental Health Considerations	7a) Severe Weather	Severe Weather - Watch for clouds and incoming weather. - Monitor weather forecasts. - Train workers about weather and appropriate precautions. - Identify a shelter and a safe place in event of tornado etc.	L
	7b) Sun	Sun - Keep body protected - Wear sunscreen, wide brimmed hat or hardhat. - Schedule work for cool part of day. - Take breaks in the shade.	L
	7c) Lightning and Thunder	Lightning and Thunder - Monitor weather channels to determine if electrical storms are forecasted. - Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.). - The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.	L
	7d) Wind	Wind - Wind chill greatly affects heat loss (see attached Wind Chill Index). - Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.	L
	7e) Cold Extremes	Cold Extremes	L

AHA - Field Work - General



Job Steps	Hazards	Controls	RAC
		Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.	
	7f) Heat Stress	Heat Stress Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the	L

AHA - Field Work - General



Job Steps	Hazards	Controls		RAC
		work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.		
	7g) Wet Bulb Globe Temperature (WBGT) Index	Wet Bulb Globe Temperature (WBGT) Index ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).		L
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES		
		80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.	
		90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.	
		105-130 degrees F	Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.	
8. Return to office/home		See AHA - Mobilization/ Demobilization and Site Preparation		L

Relative Humidity (%) furnished by National Weather Service Gray, ME

Air Temperature °F	40	45	50	55	60	65	70	75	80	85	90	95	100
	136												
	130	137											
	124	130	137										
	119	124	131	137									
	114	119	124	130	137								
	109	114	118	124	129	136							
	105	109	113	117	123	128	134						
	101	104	108	112	116	121	126	132					
	97	100	103	106	110	114	119	124	129	135			
	94	96	99	101	105	108	112	116	121	126	131		
	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	89	91	93	95	98	100	103	106	110	113	117	121
	85	87	88	89	91	93	95	97	100	102	105	108	112
	83	84	85	86	88	89	90	92	94	96	98	100	103
	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	81	81	82	82	83	84	84	85	86	86	87

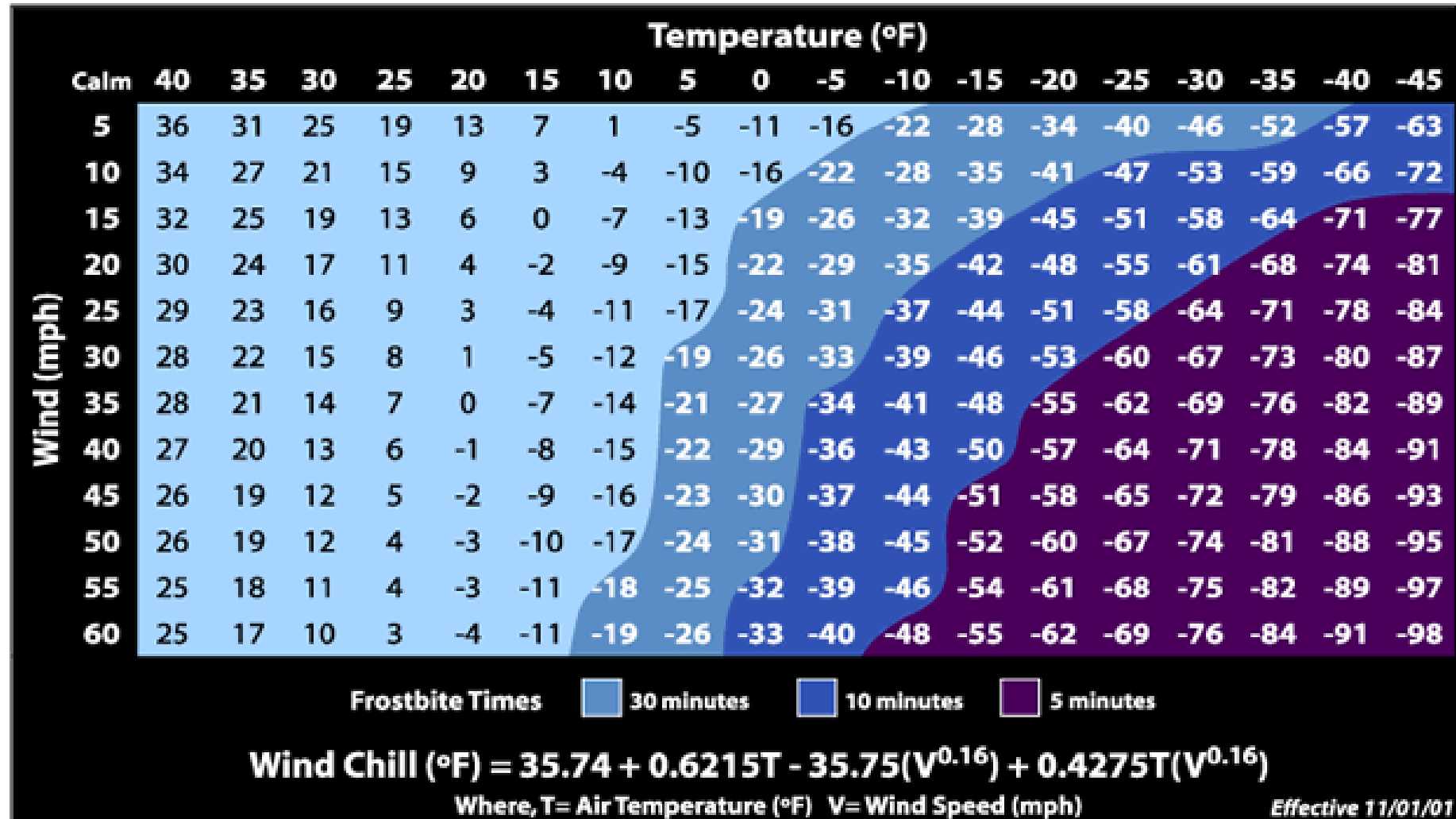
Heat Index
(Apparent
Temperature)

**With Prolonged Exposure
and/or Physical Activity**

Extreme Danger
Heat stroke or sunstroke highly likely
Danger
Sunstroke, muscle cramps, and/or heat exhaustion likely
Extreme Caution
Sunstroke, muscle cramps, and/or heat exhaustion possible
Caution
Fatigue possible



Wind Chill Chart



Attachment 3

Safety Data Sheets

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015**Revision :** 12.10.2015**Trade Name:** Alconox**1 Identification of the substance/mixture and of the supplier****1.1 Product identifier****Trade Name:** Alconox**Synonyms:****Product number:** Alconox**1.2 Application of the substance / the mixture :** Cleaning material/Detergent**1.3 Details of the supplier of the Safety Data Sheet****Manufacturer**Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040**Supplier**

Not Applicable

Emergency telephone number:**ChemTel Inc**

North America: 1-800-255-3924

International: 01-813-248-0585

2 Hazards identification**2.1 Classification of the substance or mixture:**

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate**2.2 Label elements:**

Skin irritation, category 2.

Eye irritation, category 2A.

Hazard pictograms:**Signal word:** Warning**Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P321 Specific treatment (see supplemental first aid instructions on this label).

P332+P313 If skin irritation occurs: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

P501 Dispose of contents and container as instructed in Section 13.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox

Additional information: None.

Hazard description

Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Additional Information : None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015**Revision :** 12.10.2015**Trade Name:** Alconox**4.2 Most important symptoms and effects, both acute and delayed**

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures**5.1 Extinguishing media****Suitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None**5.2 Special hazards arising from the substance or mixture :**

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters**Protective equipment:**Wear protective eye wear, gloves and clothing.
Refer to Section 8.**5.4 Additional information :**Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.**6 Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures :**Ensure adequate ventilation.
Ensure air handling systems are operational.**6.2 Environmental precautions :**Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.**6.3 Methods and material for containment and cleaning up :**

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None**7 Handling and storage****7.1 Precautions for safe handling :**Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.**7.2 Conditions for safe storage, including any incompatibilities :**

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox

8 Exposure controls/personal protection



8.1 Control parameters :

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m³.

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.

Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	Explosion limit lower: Explosion limit upper:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	Vapor pressure at 20°C:	Not determined or not available.
Odor threshold:	Not determined or not available.	Vapor density:	Not determined or not available.
pH-value:	9.5 (aqueous solution)	Relative density:	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	Solubilities:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	Partition coefficient (n-octanol/water):	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	Auto/Self-ignition temperature:	Not determined or not available.
Evaporation rate:	Not determined or not available.	Decomposition temperature:	Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox			
Flammability (solid, gaseous):	Not determined or not available.	Viscosity:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.

Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.

Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.

Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.

Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class:	None
Label:	None
LTD. QTY:	None

US DOT

Limited Quantity Exception: None

Bulk:

RQ (if applicable): None

Proper shipping Name: None

Hazard Class: None

Packing Group: None

Marine Pollutant (if applicable): No additional information.

Non Bulk:

RQ (if applicable): None

Proper shipping Name: None

Hazard Class: None

Packing Group: None

Marine Pollutant (if applicable): No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox	
Comments: None	Comments: None
14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user: Danger code (Kemler): EMS number: Segregation groups:	None None None None
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:	Not applicable.
14.8 Transport/Additional information: Transport category: Tunnel restriction code: UN "Model Regulation":	 None None None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture. North American

SARA Section 313 (specific toxic chemical listings): None of the ingredients are listed. Section 302 (extremely hazardous substances): None of the ingredients are listed.
CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable Spill Quantity: None of the ingredients are listed.
TSCA (Toxic Substances Control Act): Inventory: All ingredients are listed. Rules and Orders: Not applicable.
Proposition 65 (California): Chemicals known to cause cancer: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed. Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian Canadian Domestic Substances List (DSL): All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015**Revision :** 12.10.2015**Trade Name:** Alconox**Germany MAK:** Not classified.**Asia Pacific****Australia****Australian Inventory of Chemical Substances (AICS):** All ingredients are listed.**China****Inventory of Existing Chemical Substances in China (IECSC):** All ingredients are listed.**Japan****Inventory of Existing and New Chemical Substances (ENCS):** All ingredients are listed.**Korea****Existing Chemicals List (ECL):** All ingredients are listed.**New Zealand****New Zealand Inventory of Chemicals (NZOIC):** All ingredients are listed.**Philippines****Philippine Inventory of Chemicals and Chemical Substances (PICCS):** All ingredients are listed.**Taiwan****Taiwan Chemical Substance Inventory (TSCI):** All ingredients are listed.**16 Other information****Abbreviations and Acronyms:** None**Summary of Phrases****Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P321 Specific treatment (see supplemental first aid instructions on this label).

P332+P313 If skin irritation occurs: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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 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.

NEPA: 1-0-0

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015

Revision : 12.10.2015

Trade Name: Alconox

HMIS: 1-0-0

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: June 25, 2018

Revision: June 25, 2018

1 Identification

- **Product identifier**
- **Trade name:** Buffer Solution pH 7.00
- **Product code:** BU5007SS
- **Recommended use and restriction on use**
- **Recommended use:**
Laboratory chemicals
Industrial uses.
- **Restrictions on use:** No relevant information available.
- **Details of the supplier of the Safety Data Sheet**
- **Manufacturer/Supplier:**
AquaPhoenix Scientific, Inc.
860 Gitts Run Road
Hanover, PA 17331
Phone: (717)632-1291
Toll-Free: (866)632-1291
info@aquaphoenixsci.com
- **Emergency telephone number:**
ChemTel Inc.
(800)255-3924 (North America)
+1 (813)248-0585 (International)

2 Hazard(s) identification

- **Classification of the substance or mixture**
The product is not classified as hazardous according to the Globally Harmonized System (GHS).
- **Label elements**
The product is not classified as hazardous according to OSHA GHS regulations within the United States.
- **GHS label elements** This product does not have a classification according to the GHS regulation.
- **Hazard pictograms:** Not regulated.
- **Signal word:** Not regulated.
- **Hazard statements:** Not regulated.
- **Other hazards** There are no other hazards not otherwise classified that have been identified.

3 Composition/information on ingredients

- **Chemical characterization:** Mixtures

Components:

7732-18-5	Water	>99%
1310-73-2	Sodium hydroxide	<0.25%
	 Met. Corr. 1, H290; Skin Corr. 1A, H314; Eye Dam. 1, H318	
6359-83-7	Disodium 2-[[4,5-dihydro-3-methyl-5-oxo-1-(4-sulphonatophenyl)-1H-pyrazol-4-yl]azo]benzoate	<0.25%
52-51-7	bronopol (INN)	<0.25%
	 Acute Tox. 3, H331	
	 Eye Dam. 1, H318	

(Cont'd. on page 2)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: June 25, 2018

Revision: June 25, 2018

Trade name: Buffer Solution pH 7.00

(Cont'd. of page 1)

⚠ Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; STOT SE 3, H335

· **Additional information:**

For the wording of the listed Hazard Statements, refer to section 16.

For the listed ingredient(s), the identity and/or exact percentage(s) are being withheld as a trade secret.

4 First-aid measures

· **Description of first aid measures**

· **After inhalation:** Supply fresh air; consult doctor in case of complaints.

· **After skin contact:**

Rinse with warm water.

If skin irritation is experienced, consult a doctor.

· **After eye contact:**

Remove contact lenses if worn, if possible.

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

· **After swallowing:**

Rinse out mouth and then drink plenty of water.

Do not induce vomiting; immediately call for medical help.

· **Most important symptoms and effects, both acute and delayed:**

Nausea in case of ingestion.

Gastric or intestinal disorders when ingested.

· **Indication of any immediate medical attention and special treatment needed:**

No relevant information available.

5 Fire-fighting measures

· **Extinguishing media**

· **Suitable extinguishing agents:**

The product is not flammable.

Use fire fighting measures that suit the environment.

· **For safety reasons unsuitable extinguishing agents:** None.

· **Special hazards arising from the substance or mixture**

Formation of toxic gases is possible during heating or in case of fire.

· **Advice for firefighters**

· **Protective equipment:**

Wear self-contained respiratory protective device.

Wear fully protective suit.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**

Ensure adequate ventilation.

Use personal protective equipment as required.

· **Environmental precautions**

Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

· **Methods and material for containment and cleaning up**

(Cont'd. on page 3)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: June 25, 2018

Revision: June 25, 2018

Trade name: Buffer Solution pH 7.00

(Cont'd. of page 2)

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Send for recovery or disposal in suitable receptacles.

· **Reference to other sections**

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

7 Handling and storage

· **Handling**

· **Precautions for safe handling:**

Avoid splashes or spray in enclosed areas.

Use only in well ventilated areas.

· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**

· **Requirements to be met by storerooms and receptacles:**

Use only receptacles specifically permitted for this substance/product.

Store in cool, dry conditions in well sealed receptacles.

· **Information about storage in one common storage facility:** Store away from foodstuffs.

· **Specific end use(s)** No relevant information available.

8 Exposure controls/personal protection

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**

1310-73-2 Sodium hydroxide

PEL (USA)	Long-term value: 2 mg/m ³
REL (USA)	Ceiling limit value: 2 mg/m ³
TLV (USA)	Ceiling limit value: 2 mg/m ³
EL (Canada)	Ceiling limit value: 2 mg/m ³
EV (Canada)	Ceiling limit value: 2 mg/m ³
LMPE (Mexico)	Ceiling limit value: 2 mg/m ³

· **Exposure controls**

· **General protective and hygienic measures:**

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Avoid contact with the eyes and skin.

Avoid breathing mist, vapors, or spray.

· **Engineering controls:** Provide adequate ventilation.

· **Breathing equipment:**

Not required under normal conditions of use.

For spills, respiratory protection may be advisable.

· **Protection of hands:** Gloves are advised for repeated or prolonged contact.

(Cont'd. on page 4)

Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Printing date: June 25, 2018

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Trade name: Buffer Solution pH 7.00

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· **Eye protection:**



Safety glasses

Follow relevant national guidelines concerning the use of protective eyewear.

· **Body protection:** Protection may be required for spills.

· **Limitation and supervision of exposure into the environment**

No relevant information available.

· **Risk management measures** No relevant information available.

9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **Appearance:**

Form: Liquid

Color: Red

· **Odor:** Odorless

· **Odor threshold:** Not determined.

· **pH-value at 20 °C (68 °F):** 7.00

· **Melting point/Melting range:** Not determined.

· **Boiling point/Boiling range:** 100-101 °C (212-213.8 °F)

· **Flash point:** Not applicable.

· **Flammability (solid, gaseous):** Not applicable.

· **Auto-ignition temperature:** Not determined.

· **Decomposition temperature:** Not determined.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Explosion limits**

Lower: Not determined.

Upper: Not determined.

· **Oxidizing properties:** Non-oxidizing.

· **Vapor pressure at 20 °C (68 °F):** 23 hPa (17.3 mm Hg)

· **Density:**

Relative density: Not determined.

Vapor density: Not determined.

Evaporation rate: Not determined.

· **Solubility in / Miscibility with**

Water: Soluble.

· **Partition coefficient (n-octanol/water):** Not determined.

· **Viscosity**

Dynamic: Not determined.

Kinematic: Not determined.

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Safety Data Sheet

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· **Other information**

No relevant information available.

10 Stability and reactivity

- **Reactivity:** No relevant information available.
- **Chemical stability:**
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
- **Possibility of hazardous reactions**
Toxic fumes may be released if heated above the decomposition point.
- **Conditions to avoid** No relevant information available.
- **Incompatible materials** No relevant information available.
- **Hazardous decomposition products** Carbon monoxide and carbon dioxide

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:** Based on available data, the classification criteria are not met.
- **LD/LC50 values that are relevant for classification:** None.
- **Primary irritant effect:**
- **On the skin:** Based on available data, the classification criteria are not met.
- **On the eye:** Based on available data, the classification criteria are not met.
- **Sensitization:** No sensitizing effects known.

· **IARC (International Agency for Research on Cancer):**

None of the ingredients are listed.

· **NTP (National Toxicology Program):**

None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration):**

None of the ingredients are listed.

· **Probable route(s) of exposure:**

Ingestion.
Inhalation.
Eye contact.
Skin contact.

- **Germ cell mutagenicity:** Based on available data, the classification criteria are not met.
- **Carcinogenicity:** Based on available data, the classification criteria are not met.
- **Reproductive toxicity:** Based on available data, the classification criteria are not met.
- **STOT-single exposure:** Based on available data, the classification criteria are not met.
- **STOT-repeated exposure:** Based on available data, the classification criteria are not met.
- **Aspiration hazard:** Based on available data, the classification criteria are not met.

12 Ecological information

· **Toxicity**

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- **Aquatic toxicity** No relevant information available.
- **Persistence and degradability** No relevant information available.
- **Bioaccumulative potential:** No relevant information available.
- **Mobility in soil:** No relevant information available.
- **Additional ecological information**
- **General notes:**
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No relevant information available.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.
- **Uncleaned packagings**
- **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· UN-Number	
· DOT, ADR, IMDG, IATA	Not regulated.
· UN proper shipping name	
· DOT, ADR, IMDG, IATA	Not regulated.
· Transport hazard class(es)	
· DOT, ADR, IMDG, IATA	
· Class	Not regulated.
· Packing group	
· DOT, ADR, IMDG, IATA	Not regulated.
· Environmental hazards	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

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Safety Data Sheet

acc. to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Trade name: Buffer Solution pH 7.00

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15 Regulatory information

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
- **United States (USA)**
- **SARA**

· **Section 302 (extremely hazardous substances):**

None of the ingredients are listed.

· **Section 355 (extremely hazardous substances):**

None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**

None of the ingredients are listed.

· **TSCA (Toxic Substances Control Act)**

All ingredients are listed.

· **Proposition 65 (California)**

· **Chemicals known to cause cancer:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity for females:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity for males:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**

None of the ingredients are listed.

· **EPA (Environmental Protection Agency):**

None of the ingredients are listed.

· **IARC (International Agency for Research on Cancer):**

None of the ingredients are listed.

· **Canadian Domestic Substances List (DSL) (Substances not listed.):**

All ingredients are listed.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and acronyms:**

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

CAS: Chemical Abstracts Service (division of the American Chemical Society)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

PBT: Persistent, Bio-accumulable, Toxic

vPvB: very Persistent and very Bioaccumulative

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Safety Data Sheet

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OSHA: Occupational Safety & Health Administration

Met. Corr. 1: Corrosive to metals – Category 1

Acute Tox. 4: Acute toxicity – Category 4

Acute Tox. 3: Acute toxicity – Category 3

Skin Corr. 1A: Skin corrosion/irritation – Category 1A

Skin Irrit. 2: Skin corrosion/irritation – Category 2

Eye Dam. 1: Serious eye damage/eye irritation – Category 1

STOT SE 3: Specific target organ toxicity (single exposure) – Category 3

· Sources

Website, European Chemicals Agency (echa.europa.eu)

Website, US EPA Substance Registry Services (ofmpub.epa.gov/sor internet/registry/substreg/home/overview/home.do)

Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)

Patty's Industrial Hygiene, 6th ed., Rose, Vernon, ed. ISBN: 978-0-470-07488-6

Casarett and Doull's Toxicology: The Basic Science of Poisons, 8th Ed., Klaasen, Curtis D., ed., ISBN: 978-0-07-176923-5.

Safety Data Sheets, Individual Manufacturers

SDS Prepared by:

ChemTel Inc.

1305 North Florida Avenue

Tampa, Florida USA 33602-2902

Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573

Website: www.chemtelinc.com

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

1 Identification

- **Product identifier**
- **Trade name:** Buffer Solution pH 4.00
- **Product code:** BU5004SS
- **Recommended use and restriction on use**
- **Recommended use:** Laboratory chemicals
- **Restrictions on use:** No relevant information available.
- **Details of the supplier of the Safety Data Sheet**
- **Manufacturer/Supplier:**
AquaPhoenix Scientific, Inc.
860 Gitts Run Road
Hanover, PA 17331 USA
Tel +1 (717)632-1291
Toll-Free: (866)632-1291
info@aquaphoenixsci.com
- **Distributor:**
AquaPhoenix Scientific
860 Gitts Run Road,
Hanover, PA 17331
(717) 632-1291
- **Emergency telephone number:**
ChemTel Inc.
(800)255-3924 (North America)
+1 (813)248-0585 (International)

2 Hazard(s) identification

- **Classification of the substance or mixture**
The product is not classified as hazardous according to the Globally Harmonized System (GHS).
- **Label elements**
- **GHS label elements** Not regulated.
- **Hazard pictograms:** Not regulated.
- **Signal word:** Not regulated.
- **Hazard statements:** Not regulated.
- **Other hazards** There are no other hazards not otherwise classified that have been identified.

3 Composition/information on ingredients

- **Chemical characterization:** Mixtures

· Components:

7732-18-5	Water	>98%
877-24-7	potassium hydrogen phthalate	1.01%
110-44-1	hexa-2,4-dienoic acid	<0.1%
	⚠ Skin Irrit. 2, H315; Eye Irrit. 2A, H319; STOT SE 3, H335	
6625-46-3	2,7-Naphthalenedisulfonic acid, 5-(acetylamino)-4-hydroxy-3-[(2-methoxyphenyl)azo]-, disodium salt	<0.1%

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Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

(Cont'd. of page 1)

· Additional information:

For the wording of the listed Hazard Statements, refer to section 16.

For the listed ingredient(s), the identity and/or exact percentage(s) are being withheld as a trade secret.

4 First-aid measures

· Description of first aid measures**· After inhalation:** Supply fresh air; consult doctor in case of complaints.**· After skin contact:**

Rinse with warm water.

If skin irritation is experienced, consult a doctor.

· After eye contact:

Remove contact lenses if worn, if possible.

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

· After swallowing:

Rinse out mouth and then drink plenty of water.

Do not induce vomiting; immediately call for medical help.

· Most important symptoms and effects, both acute and delayed:

Nausea in case of ingestion.

Gastric or intestinal disorders when ingested.

· Danger: No relevant information available.**· Indication of any immediate medical attention and special treatment needed:**

No relevant information available.

5 Fire-fighting measures

· Extinguishing media**· Suitable extinguishing agents:**

The product is not flammable.

Use fire fighting measures that suit the environment.

· For safety reasons unsuitable extinguishing agents: None.**· Special hazards arising from the substance or mixture**

Formation of toxic gases is possible during heating or in case of fire.

· Advice for firefighters**· Protective equipment:**

Wear self-contained respiratory protective device.

Wear fully protective suit.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

Use personal protective equipment as required.

· Environmental precautions

Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

· Methods and material for containment and cleaning up

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Safety Data Sheet

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Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

(Cont'd. of page 2)

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Send for recovery or disposal in suitable receptacles.

Reference to other sections

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

7 Handling and storage

Handling**Precautions for safe handling:**

Avoid splashes or spray in enclosed areas.

Use only in well ventilated areas.

Information about protection against explosions and fires: No special measures required.**Conditions for safe storage, including any incompatibilities****Requirements to be met by storerooms and receptacles:**

Store only in the original receptacle.

Unsuitable material for receptacle: aluminium.

Store in cool, dry conditions in well sealed receptacles.

Information about storage in one common storage facility:

Store away from foodstuffs.

Store away from metals.

Store away from oxidizing agents.

Do not store together with alkalis (caustic solutions).

Specific end use(s) No relevant information available.

8 Exposure controls/personal protection

Control parameters**Components with limit values that require monitoring at the workplace:**

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

Exposure controls**General protective and hygienic measures:**

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Avoid contact with the eyes and skin.

Avoid breathing mist, vapors, or spray.

Engineering controls: Provide adequate ventilation.**Breathing equipment:**

Not required under normal conditions of use.

For spills, respiratory protection may be advisable.

Protection of hands:

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Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

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Trade name: Buffer Solution pH 4.00

(Cont'd. of page 3)



Protective gloves

· **Material of gloves**

Butyl rubber, BR

Fluorocarbon rubber (Viton)

Laminated film gloves.

Natural rubber, NR

Neoprene gloves

Sensibilization by the components in the glove materials is possible.

· **Eye protection:**



Safety glasses

Follow relevant national guidelines concerning the use of protective eyewear.

· **Body protection:** Protection may be required for spills.

· **Limitation and supervision of exposure into the environment**

No relevant information available.

· **Risk management measures** No relevant information available.

9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **Appearance:**

Form: Liquid

Color: Red

· **Odor:** Odorless

· **Odor threshold:** Not determined.

· **pH-value at 20 °C (68 °F):** 4.00

· **Melting point/Melting range:** Not determined.

· **Boiling point/Boiling range:** 100-101 °C (212-149.8 °F)

· **Flash point:** Not applicable.

· **Flammability (solid, gaseous):** Not applicable.

· **Auto-ignition temperature:** Not determined.

· **Decomposition temperature:** Not determined.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Explosion limits**

Lower: Not determined.

Upper: Not determined.

· **Oxidizing properties:** Non-oxidizing.

· **Vapor pressure at 20 °C (68 °F):** 23 hPa (17.3 mm Hg)

· **Density:**

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Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

(Cont'd. of page 4)

Relative density:	Not determined.
Vapor density:	Not determined.
Evaporation rate:	Not determined.

· Solubility in / Miscibility with Water:	Soluble.

· Partition coefficient (n-octanol/water):	Not determined.

· Viscosity	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Other information	No relevant information available.

10 Stability and reactivity

- **Reactivity:** No relevant information available.
- **Chemical stability:**
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
- **Possibility of hazardous reactions**
Toxic fumes may be released if heated above the decomposition point.
Reacts with alkali (lyes).
- **Conditions to avoid** Store away from oxidizing agents.
- **Incompatible materials** No relevant information available.
- **Hazardous decomposition products** Carbon monoxide and carbon dioxide

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:** Based on available data, the classification criteria are not met.
- **LD/LC50 values that are relevant for classification:** None.
- **Primary irritant effect:**
- **On the skin:** Based on available data, the classification criteria are not met.
- **On the eye:** Based on available data, the classification criteria are not met.
- **Sensitization:** No sensitizing effects known.

· IARC (International Agency for Research on Cancer):

None of the ingredients are listed.

· NTP (National Toxicology Program):

None of the ingredients are listed.

· OSHA-Ca (Occupational Safety & Health Administration):

None of the ingredients are listed.

· Probable route(s) of exposure:

Ingestion.
Inhalation.
Eye contact.

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Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

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Skin contact.

- **Germ cell mutagenicity:** Based on available data, the classification criteria are not met.
- **Carcinogenicity:** Based on available data, the classification criteria are not met.
- **Reproductive toxicity:** Based on available data, the classification criteria are not met.
- **STOT-single exposure:** Based on available data, the classification criteria are not met.
- **STOT-repeated exposure:** Based on available data, the classification criteria are not met.
- **Aspiration hazard:** Based on available data, the classification criteria are not met.

12 Ecological information

- **Toxicity**
- **Aquatic toxicity** No relevant information available.
- **Persistence and degradability** No relevant information available.
- **Bioaccumulative potential:** No relevant information available.
- **Mobility in soil:** No relevant information available.
- **Additional ecological information**
- **General notes:**
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
- **Other adverse effects** No relevant information available.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.
- **Uncleaned packagings**
- **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· UN-Number	
· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· UN proper shipping name	
· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· Transport hazard class(es)	
· DOT, ADR/RID/ADN, IMDG, IATA	
· Class	Not regulated.
· Packing group	

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Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

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· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· Environmental hazards	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
- United States (USA)
- SARA

· Section 302 (extremely hazardous substances):

None of the ingredients are listed.

· Section 313 (Specific toxic chemical listings):

None of the ingredients are listed.

· TSCA (Toxic Substances Control Act)

877-24-7 potassium hydrogen phthalate

110-44-1 hexa-2,4-dienoic acid

6625-46-3 2,7-Naphthalenedisulfonic acid, 5-(acetylamino)-4-hydroxy-3-[(2-methoxyphenyl)azo]-, disodium salt

7732-18-5 Water

· Proposition 65 (California)

· Chemicals known to cause cancer:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity for females:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity for males:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity:

None of the ingredients are listed.

· EPA (Environmental Protection Agency):

None of the ingredients are listed.

· IARC (International Agency for Research on Cancer):

None of the ingredients are listed.

· Canadian Domestic Substances List (DSL):

None of the ingredients are listed.

(Cont'd. on page 8)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: February 11, 2021

Trade name: Buffer Solution pH 4.00

(Cont'd. of page 7)

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Abbreviations and acronyms:

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

CAS: Chemical Abstracts Service (division of the American Chemical Society)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

OSHA: Occupational Safety & Health Administration

Skin Irrit. 2: Skin corrosion/irritation – Category 2

Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A

STOT SE 3: Specific target organ toxicity (single exposure) – Category 3

· Sources

Website, European Chemicals Agency (echa.europa.eu)

Website, US EPA Substance Registry Services (ofmpub.epa.gov/sor_internet/registry/substreg/home/overview/home.do)

Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)

Patty's Industrial Hygiene, 6th ed., Rose, Vernon, ed. ISBN: 978-0-470-07488-6

Casarett and Doull's Toxicology: The Basic Science of Poisons, 8th Ed., Klaasen, Curtis D., ed., ISBN: 978-0-07-176923-5.

Safety Data Sheets, Individual Manufacturers

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

1 Identification

- **Product identifier**
- **Trade name:** Conductivity Standard, 1413 µS/cm
- **Product code:** CS1413SS
- **Recommended use and restriction on use**
- **Recommended use:** Laboratory chemicals
- **Restrictions on use:** No relevant information available.
- **Details of the supplier of the Safety Data Sheet**
- **Manufacturer/Supplier:**
AquaPhoenix Scientific, Inc.
860 Gitts Run Road
Hanover, PA 17331 USA
Tel +1 (717)632-1291
Toll-Free: (866)632-1291
info@aquaphoenixsci.com
- **Distributor:**
AquaPhoenix Scientific
860 Gitts Run Road,
Hanover, PA 17331
(717) 632-1291
- **Emergency telephone number:**
ChemTel Inc.
(800)255-3924 (North America)
+1 (813)248-0585 (International)

2 Hazard(s) identification

- **Classification of the substance or mixture**
The product is not classified as hazardous according to the Globally Harmonized System (GHS).
- **Label elements**
- **GHS label elements** Not regulated.
- **Hazard pictograms:** Not regulated.
- **Signal word:** Not regulated.
- **Hazard statements:** Not regulated.
- **Precautionary statements:** Not regulated.
- **Other hazards** There are no other hazards not otherwise classified that have been identified.

3 Composition/information on ingredients

- **Chemical characterization:** Mixtures

- **Components:**

7732-18-5	Water		>99%
7447-40-7	Potassium chloride	Eye Irrit. 2B, H320	<1%

- **Additional information:**

For the listed ingredient(s), the identity and/or exact percentage(s) are being withheld as a trade secret.
For the wording of the listed Hazard Statements, refer to section 16.

(Cont'd. on page 2)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 µS/cm

(Cont'd. of page 1)

4 First-aid measures

- **Description of first aid measures**
- **General information:** No special measures required.
- **After inhalation:** Supply fresh air; consult doctor in case of complaints.
- **After skin contact:**
Rinse with warm water.
If skin irritation is experienced, consult a doctor.
- **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; immediately call for medical help.
- **Most important symptoms and effects, both acute and delayed:**
Gastric or intestinal disorders when ingested.
- **Danger:** No relevant information available.
- **Indication of any immediate medical attention and special treatment needed:**
No relevant information available.

5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
- **For safety reasons unsuitable extinguishing agents:** No relevant information available.
- **Special hazards arising from the substance or mixture**
Formation of toxic gases is possible during heating or in case of fire.
- **Advice for firefighters**
- **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
Ensure adequate ventilation.
- **Environmental precautions**
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
- **Methods and material for containment and cleaning up**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Clean the affected area carefully; suitable cleaners are:
Warm water
Dispose of the collected material according to regulations.
- **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.

(Cont'd. on page 3)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 µS/cm

See Section 13 for disposal information.

(Cont'd. of page 2)

7 Handling and storage

- **Handling**
- **Precautions for safe handling:** No special measures required.
- **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
- **Requirements to be met by storerooms and receptacles:** No special requirements.
- **Information about storage in one common storage facility:** No relevant information available.
- **Further information about storage conditions:**
Keep containers tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
- **Specific end use(s)** No relevant information available.

8 Exposure controls/personal protection

- **Control parameters**
 - **Components with limit values that require monitoring at the workplace:**
The following constituent is the only constituent of the product which has a PEL, TLV or other recommended exposure limit.
 - **Exposure controls**
 - **General protective and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
 - **Engineering controls:** Provide adequate ventilation.
 - **Breathing equipment:** Not required under normal conditions of use.
 - **Protection of hands:** Gloves not required under normal conditions of use.
 - **Material of gloves**
Butyl rubber, BR
Fluorocarbon rubber (Viton)
Neoprene gloves
Nitrile rubber, NBR
 - **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
 - **Eye protection:**
- 

Safety glasses
- Follow relevant national guidelines concerning the use of protective eyewear.
- **Body protection:** Protective work clothing
 - **Limitation and supervision of exposure into the environment** No special requirements.
 - **Risk management measures** No special requirements.

(Cont'd. on page 4)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 $\mu\text{S}/\text{cm}$

(Cont'd. of page 3)

9 Physical and chemical properties

· Information on basic physical and chemical properties

· Appearance:

Form: Liquid

Color: Clear

· Odor: Odorless

· Odor threshold: Not determined.

· pH-value: Not determined.

· Melting point/Melting range: Not determined.

· Boiling point/Boiling range: 105-110 °C (221-166 °F)

· Flash point: The product is not flammable.

· Flammability (solid, gaseous): Not applicable.

· Auto-ignition temperature: Not determined.

· Decomposition temperature: Not determined.

· Danger of explosion: Product does not present an explosion hazard.

· Explosion limits

Lower: Not determined.

Upper: Not determined.

· Oxidizing properties: Not determined.

· Vapor pressure at 20 °C (68 °F): 23 hPa (17.3 mm Hg)

· Density at 20 °C (68 °F): >1.01 g/cm³ (>8.43 lbs/gal)

· Relative density: Not determined.

· Vapor density: Not determined.

· Evaporation rate: Not determined.

· Solubility in / Miscibility with

Water: Fully miscible.

· Partition coefficient (n-octanol/water): Not determined.

· Viscosity

Dynamic: Not determined.

Kinematic: Not determined.

· Other information: No relevant information available.

10 Stability and reactivity

· **Reactivity:** No relevant information available.

· **Chemical stability:** Stable under normal temperatures and pressures.

· **Thermal decomposition / conditions to be avoided:**

No decomposition if used and stored according to specifications.

· **Possibility of hazardous reactions** No dangerous reactions known.

· **Conditions to avoid** Light, excess heat, dust generation, incompatible materials.

· **Incompatible materials** No relevant information available.

(Cont'd. on page 5)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 µS/cm

(Cont'd. of page 4)

· **Hazardous decomposition products**

Under fire conditions only:
Chlorine compounds

11 Toxicological information

· **Information on toxicological effects**

· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:** None.

· **Primary irritant effect:**

· **On the skin:** Based on available data, the classification criteria are not met.

· **On the eye:** Based on available data, the classification criteria are not met.

· **Sensitization:** Based on available data, the classification criteria are not met.

· **IARC (International Agency for Research on Cancer):**

None of the ingredients are listed.

· **NTP (National Toxicology Program):**

None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration):**

None of the ingredients are listed.

· **Probable route(s) of exposure:**

Ingestion.

Inhalation.

Eye contact.

Skin contact.

· **Germ cell mutagenicity:** Based on available data, the classification criteria are not met.

· **Carcinogenicity:** Based on available data, the classification criteria are not met.

· **Reproductive toxicity:** Based on available data, the classification criteria are not met.

· **STOT-single exposure:** Based on available data, the classification criteria are not met.

· **STOT-repeated exposure:** Based on available data, the classification criteria are not met.

· **Aspiration hazard:** Based on available data, the classification criteria are not met.

12 Ecological information

· **Toxicity**

· **Aquatic toxicity** No relevant information available.

· **Persistence and degradability** No relevant information available.

· **Bioaccumulative potential:** No relevant information available.

· **Mobility in soil:** No relevant information available.

· **Additional ecological information**

· **General notes:** Generally not hazardous for water.

· **Other adverse effects** No relevant information available.

13 Disposal considerations

· **Waste treatment methods**

(Cont'd. on page 6)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 µS/cm

(Cont'd. of page 5)

· **Recommendation:**

Smaller quantities can be disposed of with household waste.

Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.

The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

· **Uncleaned packagings**

· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**

· DOT, ADR/RID/ADN, IMDG, IATA Not regulated.

· **UN proper shipping name**

· DOT, ADR/RID/ADN, IMDG, IATA Not regulated.

· **Transport hazard class(es)**

· DOT, ADR/RID/ADN, IMDG, IATA

· Class Not regulated.

· **Packing group**

· DOT, ADR/RID/ADN, IMDG, IATA Not regulated.

· **Environmental hazards**

Not applicable.

· **Special precautions for user**

Not applicable.

· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable.

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **United States (USA)**

· **SARA**

· **Section 302 (extremely hazardous substances):**

None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**

None of the ingredients are listed.

· **TSCA (Toxic Substances Control Act)**

7447-40-7 Potassium chloride

71-23-8 propan-1-ol

7732-18-5 Water

(Cont'd. on page 7)

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: June 05, 2020

Trade name: Conductivity Standard, 1413 µS/cm

(Cont'd. of page 6)

· **Proposition 65 (California)**

· **Chemicals known to cause cancer:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity for females:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity for males:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**

None of the ingredients are listed.

· **EPA (Environmental Protection Agency):**

None of the ingredients are listed.

· **IARC (International Agency for Research on Cancer):**

None of the ingredients are listed.

· **Canadian Domestic Substances List (DSL):**

None of the ingredients are listed.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and acronyms:**

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

CAS: Chemical Abstracts Service (division of the American Chemical Society)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

OSHA: Occupational Safety & Health Administration

Eye Irrit. 2B: Serious eye damage/eye irritation – Category 2B

· **Sources**

Website, European Chemicals Agency (echa.europa.eu)

Website, US EPA Substance Registry Services (ofmpub.epa.gov/sor internet/registry/substreg/home/overview/home.do)

Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)

Patty's Industrial Hygiene, 6th ed., Rose, Vernon, ed. ISBN: 978-0-470-07488-6

Casarett and Doull's Toxicology: The Basic Science of Poisons, 8th Ed., Klaassen, Curtis D., ed., ISBN: 978-0-07-176923-5.

Safety Data Sheets, Individual Manufacturers

SDS Prepared by:

ChemTel

1305 North Florida Avenue

Tampa, Florida USA 33602-2902

Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573

Website: www.chemtel.com



SAFETY DATA SHEET

NC01685
DI WATER (DEIONIZED WATER)

Preparation Date: 07/Mar/2019

Version: 1

1. IDENTIFICATION

Product identifier

Product Name DI WATER (DEIONIZED WATER)

Other means of identification

SDS Number NC01685

Synonyms Hydrogen oxide; Dihydrogen oxide; Distilled water

Recommended use of the chemical and restrictions on use

Recommended Use For industrial use.

Restricted Uses No information available

Initial Supplier Identifier

Univar Canada Ltd.
9800 Van Horne Way
Richmond, BC V6X 1W5
Telephone: 1-866-686-4827

Emergency telephone number

24 Hour Emergency Phone Number (CANUTEC): 1-888-226-8832 (1-888-CAN-UTEC)

2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

none

Label elements

Hazard pictograms None

Hazard statements

The mixture does not meet the criteria for classification.

Prevention

Wash hands thoroughly after handling

Wear protective gloves/protective clothing/eye protection/face protection

In case of inadequate ventilation wear respiratory protection

Response

Read the label and safety data sheet before use.

Flush eyes with plenty amounts of water.

If eye irritation persists: Get medical advice/attention

IF ON SKIN: Wash skin with plenty of water.

If skin irritation occurs: Get medical advice/attention

Move person to fresh air.

Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

Storage

Store in accordance with good industrial practices.

Disposal

Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Chemical Name	CAS No	Weight-%	Synonyms
Water	7732-18-5	80 - 100%	Water

Notes:

The actual percentage concentration has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of first aid measures**Inhalation**

Remove to fresh air.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash skin with soap and water.

Ingestion

Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects, both acute and delayed:

No information available

Indication of any immediate medical attention and special treatment needed:

Note to physicians

None known.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

Specific hazards arising from the substance or mixture

None expected.

Hazardous combustion products

See section 10 for more information.

Special protective equipment and precautions for fire-fighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

Environmental precautions

See Section 12 for additional Ecological Information.

Methods and materials for containment and cleaning up

Prevent further leakage or spillage if safe to do so.

7. HANDLING AND STORAGE

Precautions for safe handling

Keep the containers closed when not in use. Protect from freezing. Water is considered a non-regulated product, but may react vigorously with some specific materials. Avoid contact with all materials until investigation shows substance is compatible.

Conditions for safe storage, including any incompatibilities

Store in accordance with good industrial practices.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Limits

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Chemical Name	Alberta OEL	British Columbia OEL	Ontario	Quebec OEL	Exposure Limit - ACGIH	Immediately Dangerous to Life or Health - IDLH
Water 7732-18-5	Not available	Not available	Not available	Not available	Not available	Not available

Consult local authorities for recommended exposure limits

Appropriate engineering controls**Engineering controls**

No special provisions are required.

Individual protection measures, such as personal protective equipment**Eye/face protection**

Safety glasses.

Hand protection

No special protection needed.

Skin and body protection

No special protective clothing is required.

Respiratory protection

None known.

General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties**Appearance**

Physical state	Liquid
Color	Clear, colorless
Odor	Odorless
Odor threshold	No information available

PROPERTIES**Values****Remarks • Method**

pH	7.0	
Melting point / freezing point	0 °C / 32 °F	
Initial boiling point/boiling range	100 °C / 212 °F	
Flash point	No data available	None known
Evaporation rate	<1	
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		
Upper flammability limit:	No data available	
Lower flammability limit:	No data available	
Vapor pressure	17.5 mm Hg @ 20°C	
Relative vapor density	0.62	
Specific Gravity	1.0	
Water solubility	Completely soluble	
Solubility in other solvents	No data available	

Partition coefficient	No data available	
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	None known
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known
Explosive properties	No information available.	
Oxidizing properties	No information available.	
Molecular weight	18.02	
VOC Percentage Volatility	No information available	
Liquid Density	No information available	
Bulk density	No information available	

10. STABILITY AND REACTIVITY

Reactivity/Chemical Stability

Stable under normal conditions

Possibility of hazardous reactions

No additional remark.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong reducing agents. Acid chlorides. Should not be combined with phosphorus materials.

Hazardous decomposition products

None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation

Specific test data for the substance or mixture is not available.

Eye contact

Specific test data for the substance or mixture is not available.

Skin contact

Specific test data for the substance or mixture is not available.

Ingestion

Specific test data for the substance or mixture is not available.

Information on toxicological effects

Symptoms

No additional information available.

Numerical measures of toxicity

Acute toxicity

Unknown acute toxicity No information available

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Water 7732-18-5	> 90 mL/kg (Rat)	Not available	Not available

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

Skin corrosion/irritation

No information available.

Serious eye damage/eye irritation

No information available.

Respiratory or skin sensitization

No information available.

Germ cell mutagenicity

No information available.

Carcinogenicity

No information available.

Chemical Name	ACGIH	IARC	NTP	OSHA
Water 7732-18-5	Not available	Not available	Not available	Not available

Reproductive toxicity

No information available.

Specific target organ systemic toxicity - single exposure

No information available.

Specific target organ systemic toxicity - repeated exposure

No information available.

Aspiration hazard

No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Chemical Name	Ecotoxicity - Freshwater Algae Data	Ecotoxicity - Fish Species Data	Toxicity to microorganisms	Crustacea
Water 7732-18-5	Not available	Not available	Not available	Not available

Persistence and degradability No information available.

Bioaccumulation No information available.

Chemical Name	Partition coefficient
Water 7732-18-5	Not available

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Recover or recycle if possible. If material becomes contaminated during use, dispose of accordingly.

Do not reuse empty containers.

14. TRANSPORT INFORMATION

TDG (Canada):

UN Number	Not applicable
Shipping name	Not regulated
Class	Not applicable
Packing Group	Not applicable
Marine pollutant	Not available.

DOT (U.S.)

UN Number	Not applicable
Shipping name	Not regulated
Class	Not applicable
Packing Group	Not applicable
Marine pollutant	Not available

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

U.S. Regulatory Rules

Chemical Name	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Water - 7732-18-5	Not Listed	Not Listed	Not Listed

International Inventories

TSCA

All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

DSL/NDSL

All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

16. OTHER INFORMATION

NFPA:	Health hazards 0	Flammability 0	Instability 0	Physical and chemical properties -
HMIS:	Health hazards 0	Flammability 0	Physical hazards 0	Personal protection X

Legend Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

Prepared By: The Environment, Health and Safety Department of Univar Canada Ltd.

Preparation Date: 07/Mar/2019

Revision Date: 07/Mar/2019

Disclaimer

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End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

Issue Date 15-Feb-2021

Revision Date 26-Jan-2024

Version 7.8

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1. IDENTIFICATION

Product identifier

Product Name StablCal® Standard, 10 NTU

Other means of identification

Product Code(s) 2659949

Safety data sheet number M03414

Recommended use of the chemical and restrictions on use

Recommended Use Water Analysis. Standard solution.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

EN / AGHS

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Product Code(s) 2659949
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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.01%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or

clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical Product is or contains a sensitizer. May cause sensitization by inhalation and skin contact. May cause sensitization by skin contact.

Hazardous combustion products This material will not burn. Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides (NOx).

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Provide extract ventilation to points where emissions occur. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer;respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

Environmental exposure controls

Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

Product Code(s) 2659949
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Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid		
Appearance	Turbid solution aqueous solution	Color	white
Odor	Odorless	Odor threshold	No data available

Property	Values	Remarks • Method
Molecular weight	No data available	
pH	8.48	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available

Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit No data available
Lower explosion limit No data available

Flammable properties

Flash point No data available

Flammability Limit in Air

Upper flammability limit: No data available
Lower flammability limit: No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

Hazardous polymerization does not occur.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. May cause sensitization by skin contact.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

1E-05% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

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Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data
Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

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Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *invitro* Data

No data available.

Substance *invitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

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Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

1E-05% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde (<0.1%)	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN

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CAS#: 50-00-0					
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

Not applicable, U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT

Not regulated

TDG

Not regulated

IATA

Not regulated

IMDG

Not regulated

Note:

No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

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National Inventories

TSCA Complies
DSL/NDSL Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS Complies
ENCS Does not comply
IECSC Complies
KECL Complies
PICCS Does not comply
TCSI Complies
AICS Complies
NZIoC Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
TCSI - Taiwan Chemical Substances Inventory
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard Yes
Chronic Health Hazard No
Fire hazard No
Sudden release of pressure hazard No
Reactive Hazard No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

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Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Special Comments

None

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR)	0.1 %

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	Declarable Substance (LR) Declarable Substance (FI)	

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.

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SKN* Skin designation
RSP+ Respiratory sensitization
C Carcinogen
M mutagen

SKN+ Skin sensitization
** Hazard Designation
R Reproductive toxicant

Prepared By Hach Product Compliance Department

Issue Date 15-Feb-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2023

End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

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1. IDENTIFICATION

Product identifier

Product Name StablCal® Standard, 20 NTU

Other means of identification

Product Code(s) 2660153

Safety data sheet number M03881

Recommended use of the chemical and restrictions on use

Recommended Use Water Analysis. Standard solution.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

Aqueous solution of organic salts and polymers.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.01%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or

clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable Extinguishing Media	Caution: Use of water spray when fighting fire may be inefficient.
Specific hazards arising from the chemical	Product is or contains a sensitizer. May cause sensitization by inhalation and skin contact. May cause sensitization by skin contact.
Hazardous combustion products	This material will not burn.
Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Provide extract ventilation to points where emissions occur. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer;respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

Environmental exposure controls

Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

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Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Turbid solution
Color	Milky white
Odor	Odorless
Odor threshold	No data available

Property	Values	Remarks • Method
Molecular weight	Not applicable	
pH	7.85	@ 20 °C
Melting point / freezing point	0 °C / 32 °F	
Initial boiling point and boiling range	100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
Acid	Soluble	> 1000 mg/L	25 °C / 77 °F

Other information

Metal Corrosivity

Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available

Volatile Organic Compounds (VOC) Content
No information available See ingredients information below

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Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit
Lower explosion limit

Not applicable
Not applicable

Flammable properties

Flash point

No data available

Flammability Limit in Air

Upper flammability limit:
Lower flammability limit:

No data available
No data available

Oxidizing properties

No data available.

Bulk density

Not applicable

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

Hazardous polymerization does not occur.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. May cause sensitization by skin contact.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

0% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available

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ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Mixture

No data available.

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Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

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Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen A1 - Known Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

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Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *invitro* Data

No data available.

Substance *invitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN

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Diammonium sulfate (<0.01%) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT

Not regulated

TDG

Not regulated

IATA

Not regulated

IMDG

Not regulated

Note:

No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

National Inventories

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TSCA Complies
DSL/NDSL Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS Complies
ENCS Does not comply
IECSC Complies
KECL Complies
PICCS Does not comply
TCSI Complies
AICS Complies
NZIoC Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
TCSI - Taiwan Chemical Substances Inventory
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

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Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Special Comments

None

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %

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Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR) Declarable Substance (LR) Declarable Substance (FI)	0.1 %

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state

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regulations.

SKN* Skin designation
RSP+ Respiratory sensitization
C Carcinogen
M mutagen

SKN+ Skin sensitization
** Hazard Designation
R Reproductive toxicant

Prepared By Hach Product Compliance Department

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Version 8.1

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1. IDENTIFICATION

Product identifier

Product Name StablCal® Standard, 100 NTU

Other means of identification

Product Code(s) 2660249

Safety data sheet number M03412

Recommended use of the chemical and restrictions on use

Recommended Use Standard solution. Water Analysis.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or

clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical May cause sensitization by inhalation and skin contact. Product is or contains a sensitizer. May cause sensitization by skin contact.

Hazardous combustion products This material will not burn. Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides (NOx).

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Provide extract ventilation to points where emissions occur. Remove contaminated clothing and shoes. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer;respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required. Wear breathing apparatus if exposed to vapors/dusts/aerosols.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eyeface protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

Environmental exposure controls

Local authorities should be advised if significant spillages cannot be contained. Do not allow

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into any sewer, on the ground or into any body of water.

Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid		
Appearance	Turbid solution aqueous solution	Color	white
Odor	Odorless	Odor threshold	No data available

Property	Values	Remarks • Method
Molecular weight	No data available	
pH	8.26	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available

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Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit
Lower explosion limit

No data available
No data available

Flammable properties

Flash point

Not applicable

Flammability Limit in Air

Upper flammability limit:
Lower flammability limit:

No data available
No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

None under normal processing.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

3.731E-05% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

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No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen

OSHA	X - Present

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *in vitro* Data

No data available.

Substance *in vitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

4E-05% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN

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(<0.1%) CAS#: 50-00-0					
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity
No data available.

Persistence and degradability

Mixture
No data available.

Mixture
No data available.

Partition coefficient Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient Not applicable

Other adverse effects
No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging Do not reuse empty containers.

US EPA Waste Number Not applicable, U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT Not regulated

TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

National Inventories

TSCA	Complies
DSL/NDL	Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Does not comply
TCSI	Complies
AICS	Complies
NZIoC	Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

TCSI - Taiwan Chemical Substances Inventory

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

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Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Special Comments

None

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %

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Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR) Declarable Substance (LR) Declarable Substance (FI)	0.1 %

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state

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regulations.

SKN* Skin designation
RSP+ Respiratory sensitization
C Carcinogen
M mutagen

SKN+ Skin sensitization
** Hazard Designation
R Reproductive toxicant

Prepared By Hach Product Compliance Department

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2023

End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

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1. IDENTIFICATION

Product identifier

Product Name STABLCAL® FORMAZIN STANDARD 800 NTU

Other means of identification

Product Code(s) 2660501

Safety data sheet number M03413

Recommended use of the chemical and restrictions on use

Recommended Use Laboratory Use. Standard solution.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to

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protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical Product is or contains a sensitizer. May cause sensitization by inhalation and skin contact. May cause sensitization by skin contact.

Hazardous combustion products This material will not burn. Carbon dioxide (CO₂). Carbon monoxide. Nitrogen oxides (NO_x). Formaldehyde.

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

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Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Provide extract ventilation to points where emissions occur. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer; respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

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Environmental exposure controls Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid		
Appearance	Turbid solution aqueous solution	Color	white
Odor	Odorless	Odor threshold	No data available

Property	Values	Remarks • Method
Molecular weight	No data available	
pH	7.36	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

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Steel Corrosion Rate
Aluminum Corrosion Rate

No data available
No data available

Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit
Lower explosion limit

No data available
No data available

Flammable properties

Flash point

No data available

Flammability Limit in Air

Upper flammability limit:
Lower flammability limit:

No data available
No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

None under normal processing.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION**Information on likely routes of exposure****Product Information**

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. May cause sensitization by skin contact.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms

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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

0% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS

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Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate	Man	1500 mg/kg	None reported	Gastrointestinal	RTECS

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($<0.1\%$) CAS#: 7783-20-2	TD _{Lo}			Gas	

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane ($<10\%$) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane ($<10\%$) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde ($<0.1\%$) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-

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Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen A1 - Known Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *invitro* Data

No data available.

Substance *invitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

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Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

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($<0.1\%$) CAS#: 7783-20-2					

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate ($<1\%$) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde ($<0.1\%$) CAS#: 50-00-0	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN
Diammonium sulfate ($<0.1\%$) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT

Not regulated

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TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

National Inventories

TSCA Complies

DSL/NDSL Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS Complies

ENCS Does not comply

IECSC Complies

KECL Complies

PICCS Does not comply

TCSI Complies

AICS Complies

NZIoC Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

TCSI - Taiwan Chemical Substances Inventory

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

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Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde ($<0.1\%$) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Special Comments

None

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR) Declarable Substance (LR) Declarable Substance (FI)	0.1 %

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)

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SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By Hach Product Compliance Department

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2023

End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

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1. IDENTIFICATION

Product identifier

Product Name STABLCAL® FORMAZIN STANDARD 20 NTU

Other means of identification

Product Code(s) 2684801

Safety data sheet number M03409

Recommended use of the chemical and restrictions on use

Recommended Use Standard solution. Water Analysis.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

Safety Data Sheets are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article".

According to OSHA, Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger

**Hazard statements**

H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture**Chemical Family**

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.01%	-

4. FIRST AID MEASURES

Description of first aid measures**General advice**

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids.

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Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms

May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians

May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media

Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

Product is or contains a sensitizer. May cause sensitization by inhalation and skin contact. May cause sensitization by skin contact.

Hazardous combustion products

This material will not burn. Carbon monoxide. Ammonia. Formaldehyde. Nitrogen oxides.

Special protective equipment for fire-fighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice

Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions

Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information

Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions

Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.
Prevention of secondary hazards	Clean contaminated objects and areas thoroughly observing environmental regulations.
Reference to other sections	See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE**Precautions for safe handling**

Advice on safe handling	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Provide extract ventilation to points where emissions occur. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.
Flammability class	Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Control parameters****Exposure Guidelines**

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer; respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls	Showers Eyewash stations Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection	No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required. Wear breathing apparatus if exposed to vapors/dusts/aerosols.

Hand Protection	Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III

according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Environmental exposure controls

Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

Thermal hazards

None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid		
Appearance	Turbid solution aqueous solution	Color	white
Odor	Odorless	Odor threshold	No data available

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
Molecular weight	No data available	
pH	8.26	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No information available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

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<u>Water solubility classification</u>	<u>Water solubility</u>	<u>Water Solubility Temperature</u>
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

<u>Chemical Name</u>	<u>Solubility classification</u>	<u>Solubility</u>	<u>Solubility Temperature</u>
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

Steel Corrosion Rate

No data available

Aluminum Corrosion Rate

No data available

Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit

No data available

Lower explosion limit

No data available

Flammable properties

Flash point

No data available

Flammability Limit in Air

Upper flammability limit:

No data available

Lower flammability limit:

No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

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Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

Hazardous polymerization does not occur.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. May cause sensitization by skin contact.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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.
Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%)	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

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CAS#: 50-00-0					

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

0% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported	Exposure	Results	Key literature

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			dose	time		references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

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Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *invitro* Data

No data available.

Substance *invitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

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(<10%) CAS#: 100-97-0						

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

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Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

U122

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Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

<u>DOT</u>	Not regulated
<u>TDG</u>	Not regulated
<u>IATA</u>	Not regulated
<u>IMDG</u>	Not regulated
Note:	No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

National Inventories

TSCA	Complies
DSL/NDL	Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS	Complies
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Does not comply
TCSI	Complies
AICS	Complies
NZIoC	Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

TCSI - Taiwan Chemical Substances Inventory

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

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SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION**Special Comments**

None

Additional information**Global Automotive Declarable Substance List (GADSL)**

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR) Declarable Substance (LR) Declarable Substance (FI)	0.1 %

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)

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LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By Hach Product Compliance Department

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2023

End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

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1. IDENTIFICATION

Product identifier

Product Name STABLCAL® FORMAZIN STANDARD 100 NTU

Other means of identification

Product Code(s) 2684901

Safety data sheet number M03412

Recommended use of the chemical and restrictions on use

Recommended Use Standard solution. Water Analysis.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.1%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to

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protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable Extinguishing Media	Caution: Use of water spray when fighting fire may be inefficient.
Specific hazards arising from the chemical	May cause sensitization by inhalation and skin contact. Product is or contains a sensitizer. May cause sensitization by skin contact.
Hazardous combustion products	This material will not burn. Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides (NOx).
Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

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Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Provide extract ventilation to points where emissions occur. Remove contaminated clothing and shoes. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer; respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required. Wear breathing apparatus if exposed to vapors/dusts/aerosols.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

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Environmental exposure controls Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid	Color	white
Appearance	Turbid solution aqueous solution	Odor threshold	No data available
Odor	Odorless		

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
Molecular weight	No data available	
pH	8.26	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

<u>Water solubility classification</u>	<u>Water solubility</u>	<u>Water Solubility Temperature</u>
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

<u>Chemical Name</u>	<u>Solubility classification</u>	<u>Solubility</u>	<u>Solubility Temperature</u>
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

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Steel Corrosion Rate
Aluminum Corrosion Rate

No data available
No data available

Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit
Lower explosion limit

No data available
No data available

Flammable properties

Flash point

Not applicable

Flammability Limit in Air

Upper flammability limit:
Lower flammability limit:

No data available
No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

None under normal processing.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION**Information on likely routes of exposure****Product Information**

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	May cause sensitization by skin contact. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

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3.731E-05% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%)	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS

CAS#: 50-00-0						
Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS

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Diammonium sulfate (<0.1%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-

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Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *invitro* Data

No data available.

Substance *invitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION**Ecotoxicity**

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

4E-05% of the mixture consists of component(s) of unknown hazards to the aquatic environment.

Mixture**Aquatic Acute Toxicity**

No data available.

Aquatic Chronic Toxicity

No data available.

Substance**Aquatic Acute Toxicity**

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

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($<0.1\%$) CAS#: 7783-20-2					

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate ($<1\%$) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde ($<0.1\%$) CAS#: 50-00-0	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN
Diammonium sulfate ($<0.1\%$) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

Not applicable, U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT

Not regulated

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TDG Not regulated

IATA Not regulated

IMDG Not regulated

Note: No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

National Inventories

TSCA Complies

DSL/NDSL Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS Complies

ENCS Does not comply

IECSC Complies

KECL Complies

PICCS Does not comply

TCSI Complies

AICS Complies

NZIoC Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

TCSI - Taiwan Chemical Substances Inventory

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

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Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues
Formaldehyde ($<0.1\%$) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION**Special Comments**

None

Additional information**Global Automotive Declarable Substance List (GADSL)**

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR) Declarable Substance (LR) Declarable Substance (FI)	0.1 %

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)

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WHO

WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.
SKN*	Skin designation	SKN+	Skin sensitization
RSP+	Respiratory sensitization	**	Hazard Designation
C	Carcinogen	R	Reproductive toxicant
M	mutagen		

Prepared By Hach Product Compliance Department

Issue Date 25-Jan-2021

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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End of Safety Data Sheet



Be Right™

SAFETY DATA SHEET

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1. IDENTIFICATION

Product identifier

Product Name 10 NTU Verification Standard

Other means of identification

Product Code(s) 2961801

Safety data sheet number M03414

Recommended use of the chemical and restrictions on use

Recommended Use Water Analysis. Standard solution.

Uses advised against Consumer use.

Restrictions on use For Laboratory Use Only.

Details of the supplier of the safety data sheet

Manufacturer Address

Hach Company, P.O.Box 389, Loveland, CO 80539, USA, +1(970) 669-3050

Emergency telephone number

+1(303) 623-5716 - 24 Hour Service

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

Signal word

Danger



Hazard statements

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H317 - May cause an allergic skin reaction

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray

P285 - In case of inadequate ventilation wear respiratory protection

P304 + P341 - IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing

P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

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

P272 - Contaminated work clothing should not be allowed out of the workplace

P280 - Wear protective gloves, protective clothing, eye protection, and face protection

P302 + P352 - IF ON SKIN: Wash with plenty of soap and water

P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention

P363 - Wash contaminated clothing before reuse

Other Hazards Known

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable

Mixture

Chemical Family

Mixture.

Chemical nature

aqueous solution.

Percent ranges are used where confidential product information is applicable.

Chemical name	CAS No	Percent Range	HMRIC #
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	<10%	-
Sodium sulfate	7757-82-6	<1%	-
Formaldehyde	50-00-0	<0.1%	-
Diammonium sulfate	7783-20-2	<0.01%	-

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

May cause allergic respiratory reaction. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Get immediate medical advice/attention.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.

Ingestion

May produce an allergic reaction. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or

clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

Most important symptoms and effects, both acute and delayed

Symptoms May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing. Itching. Rashes. Hives.

Indication of any immediate medical attention and special treatment needed

Note to physicians May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical Product is or contains a sensitizer. May cause sensitization by inhalation and skin contact. May cause sensitization by skin contact.

Hazardous combustion products This material will not burn. Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides (NOx).

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

U.S. Notice Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Take up mechanically, placing in appropriate containers for disposal.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

Reference to other sections See section 8 for more information. See section 13 for more information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Provide extract ventilation to points where emissions occur. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane CAS#: 100-97-0	dermal sensitizer TWA: 1 mg/m ³ inhalable fraction and vapor	NDF	NDF
Formaldehyde CAS#: 50-00-0	dermal sensitizer;respiratory sensitizer STEL: 0.3 ppm TWA: 0.1 ppm	TWA: 0.75 ppm (vacated) TWA: 3 ppm (vacated) STEL: 10 ppm (vacated) Ceiling: 5 ppm STEL: 2 ppm	IDLH: 20 ppm Ceiling: 0.1 ppm 15 min TWA: 0.016 ppm

Appropriate engineering controls

Engineering Controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hand Protection

Wear suitable gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 2016/425 and the standard EN 374 derived from it. Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374-1:2016.

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin and body protection

Wear suitable protective clothing.

General Hygiene Considerations

Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

Environmental exposure controls

Local authorities should be advised if significant spillages cannot be contained. Do not allow into any sewer, on the ground or into any body of water.

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Thermal hazards None under normal processing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Liquid		
Appearance	Turbid solution aqueous solution	Color	white
Odor	Odorless	Odor threshold	No data available

Property	Values	Remarks • Method
Molecular weight	No data available	
pH	8.48	@ 20 °C
Melting point / freezing point	~ 0 °C / 32 °F	
Initial boiling point and boiling range	~ 100 °C / 212 °F	
Evaporation rate	1 (water = 1)	
Vapor pressure	17.477 mm Hg / 2.33 kPa at 20 °C / 68 °F	
Relative vapor density	0.62	
Specific gravity - VALUE 1	1.02	
Partition coefficient	Not applicable	
Soil Organic Carbon-Water Partition Coefficient	Not applicable	
Autoignition temperature	No data available	
Decomposition temperature	No data available	
Dynamic viscosity	No data available	
Kinematic viscosity	No data available	

Solubility(ies)

Water solubility

Water solubility classification	Water solubility	Water Solubility Temperature
Soluble	> 1000 mg/L	25 °C / 77 °F

Solubility in other solvents

Chemical Name	Solubility classification	Solubility	Solubility Temperature
None reported	No information available	No data available	No information available

Other information

Metal Corrosivity

Steel Corrosion Rate	No data available
Aluminum Corrosion Rate	No data available

Volatile Organic Compounds (VOC) Content

No information available See ingredients information below

Chemical name	CAS No	Volatile organic compounds (VOC) content	CAA (Clean Air Act)
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	Not applicable	X
Sodium sulfate	7757-82-6	No data available	-
Formaldehyde	50-00-0	No data available	X
Diammonium sulfate	7783-20-2	No data available	-

Explosive properties

Upper explosion limit No data available
Lower explosion limit No data available

Flammable properties

Flash point No data available

Flammability Limit in Air

Upper flammability limit: No data available
Lower flammability limit: No data available

Oxidizing properties

No data available.

Bulk density

No data available

10. STABILITY AND REACTIVITY

Reactivity

Not applicable.

Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of hazardous reactions

None under normal processing.

Hazardous polymerization

Hazardous polymerization does not occur.

Conditions to avoid

None known based on information supplied.

Incompatible materials

Strong oxidizing agents, strong acids, and strong bases.

Hazardous decomposition products

Ammonia. Carbon monoxide. Formaldehyde. Nitrogen oxides. Sodium oxides. Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation	May cause sensitization in susceptible persons.
Eye contact	No known effect based on information supplied.
Skin contact	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. May cause sensitization by skin contact.
Ingestion	May cause additional affects as listed under "Inhalation".

Symptoms 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. Coughing and/ or wheezing. Itching. Rashes. Hives.

Acute toxicity

Based on available data, the classification criteria are not met

Mixture

No data available.

Ingredient Acute Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LD ₅₀	100 mg/kg	None reported	None reported	GESTIS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Rat LD ₅₀	2840 mg/kg	None reported	None reported	GESTIS

Dermal Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rabbit LD ₅₀	270 mg/kg	None reported	None reported	GESTIS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat LC ₅₀	0.578 mg/L	4 hours	None reported	LOLI

Unknown Acute Toxicity

1E-05% of the mixture consists of ingredient(s) of unknown toxicity.

Acute Toxicity Estimations (ATE)

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	No information available
ATEmix (dermal)	No information available
ATEmix (inhalation-dust/mist)	No information available
ATEmix (inhalation-vapor)	No information available
ATEmix (inhalation-gas)	No information available

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Skin Corrosion/Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 404: Acute Dermal Corrosion/Irritation	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	500 mg	4 hours	Not corrosive or irritating to skin	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Standard Draize Test	Human	0.150 mg	72 hours	Corrosive to skin	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	800 mg	20 hours	Not corrosive or irritating to skin	ECHA

Serious eye damage/irritation

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Eye Damage/Eye Irritation Data

Test data reported below.

Chemical name	Test method	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test 405: Acute Eye Corrosion/Irritation	Rabbit	100 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	Standard Draize Test	Rabbit	90 mg	24 hours	Not corrosive or irritating to eyes	ECHA
Formaldehyde (<0.1%) CAS#: 50-00-0	Rinse Test	Human	1 ppm	6 minutes	Corrosive to eyes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Standard Draize Test	Rabbit	0.050 mL	None reported	Not corrosive or irritating to eyes	ECHA

Respiratory or skin sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

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Mixture

No data available.

Ingredient Sensitization Data

Test data reported below.

Skin Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	OECD Test No. 406: Skin Sensitization	Guinea pig	Confirmed to be a skin sensitizer	ECHA
Sodium sulfate (<1%) CAS#: 7757-82-6	OECD Test No. 406: Skin Sensitization	Guinea pig	Not confirmed to be a skin sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	Patch test	Human	Confirmed to be a skin sensitizer	ERMA

Respiratory Sensitization Exposure Route

Chemical name	Test method	Species	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Based on human experience	Human	Confirmed to be a respiratory sensitizer	HSDB
Formaldehyde (<0.1%) CAS#: 50-00-0	IgE Specific Immune Response Test	Guinea pig	Confirmed to be a respiratory sensitizer	CICAD

STOT - single exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Single Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human LD _{Lo}	70 mg/kg	None reported	Gastrointestinal Kidney, Ureter, or Bladder Liver Other changes Ulcerated stomach Other changes	RTECS
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	Man TD _{Lo}	1500 mg/kg	None reported	Gastrointestinal Gas	RTECS

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Specific Target Organ Toxicity Repeat Exposure Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat NOAEL	80 mg/kg	None reported	None reported	Vendor SDS

Inhalation (Dust/Mist) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Rat TC _{Lo}	350 mg/m ³	21 days	Kidney, Ureter, or Bladder Urine volume decreased or anuria Nutritional and Gross Metabolic Weight loss or decreased weight gain Biochemical Enzyme inhibition, induction, or change in blood or tissue levels (true cholinesterase)	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Human TC _{Lo}	0.017 mg/L	0.5 days	Eye Lungs, Thorax, or Respiration Lacrimation Other changes	RTECS

Carcinogenicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Carcinogenicity Data

Test data reported below.

Chemical name	CAS No	ACGIH	IARC	NTP	OSHA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	100-97-0	-	-	-	-
Sodium sulfate	7757-82-6	-	-	-	-
Formaldehyde	50-00-0	A1	Group 1	Known	X
Diammonium sulfate	7783-20-2	-	-	-	-

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)	A2 - Suspected Human Carcinogen
IARC (International Agency for Research on Cancer)	Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)	Known - Known Carcinogen
OSHA	X - Present

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat	15 mg/L	78 weeks	Olfaction Tumors	RTECS

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Mixture *in vitro* Data

No data available.

Substance *in vitro* Data

Test data reported below.

Chemical name	Test	Cell Strain	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Cytogenetic analysis	Human HeLa Cell	1 mmol/L	None reported	Positive test result for mutagenicity	RTECS

Mixture *in vivo* Data

No data available.

Substance *in vivo* Data

Test data reported below.

Oral Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane (<10%) CAS#: 100-97-0	Dominant lethal test	Mouse	25000 mg/kg	None reported	Positive test result for mutagenicity	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Test	Species	Reported dose	Exposure time	Results	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Micronucleus test	Human	.000985 mg/L	8.5 years	Positive test result for mutagenicity	RTECS

Reproductive toxicity

Based on available data, the classification criteria are not met.

Mixture

No data available.

Ingredient Reproductive Toxicity Data

Test data reported below.

Oral Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	Mouse TD _{Lo}	14000 mg/kg	4 days	Effects on Newborn Other neonatal measures or effects	RTECS

Inhalation (Vapor) Exposure Route

Chemical name	Endpoint type	Reported dose	Exposure time	Toxicological effects	Key literature references and sources for data
Formaldehyde (<0.1%) CAS#: 50-00-0	Rat TC _{Lo}	40 mg/L	14 days	Effects on Embryo or Fetus Fetotoxicity (except death e.g. stunted fetus)	RTECS

Aspiration hazard

Based on available data, the classification criteria are not met.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Based on available data, the classification criteria are not met.

Unknown aquatic toxicity

1E-05% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Mixture

Aquatic Acute Toxicity

No data available.

Aquatic Chronic Toxicity

No data available.

Substance

Aquatic Acute Toxicity

Test data reported below.

Fish

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	96 hours	None reported	LC ₅₀	56 mg/L	IUCLID
Formaldehyde (<0.1%) CAS#: 50-00-0	96 hours	<i>Morone saxatilis</i>	LC ₅₀	6.7 mg/L	PEEN
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	96 hours	<i>Oncorhynchus mykiss</i>	LC ₅₀	36.7 mg/L	GESTIS

Crustacea

Chemical name	Exposure time	Species	Endpoint type	Reported dose	Key literature references and sources for data
Sodium sulfate (<1%) CAS#: 7757-82-6	48 Hours	<i>Daphnia magna</i>	EC ₅₀	3150 mg/L	IUCLID
Formaldehyde (<0.1%)	48 Hours	<i>Daphnia pulex</i>	EC ₅₀	5.8 mg/L	PEEN

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CAS#: 50-00-0					
Diammonium sulfate (<0.01%) CAS#: 7783-20-2	48 Hours	None reported	LC ₅₀	14 mg/L	GESTIS

Aquatic Chronic Toxicity

No data available.

Persistence and degradability

Mixture

No data available.

Mixture

No data available.

Partition coefficient

Not applicable

Mobility

Soil Organic Carbon-Water Partition Coefficient

Not applicable

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products

Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging

Do not reuse empty containers.

US EPA Waste Number

Not applicable, U122

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Formaldehyde 50-00-0	U122	Included in waste streams: K009, K010, K038, K040, K156, K157	-	U122

14. TRANSPORT INFORMATION

DOT

Not regulated

TDG

Not regulated

IATA

Not regulated

IMDG

Not regulated

Note:

No special precautions necessary.

Additional information

15. REGULATORY INFORMATION

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National Inventories

TSCA Complies
DSL/NDSL Complies

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

International Inventories

EINECS/ELINCS Complies
ENCS Does not comply
IECSC Complies
KECL Complies
PICCS Does not comply
TCSI Complies
AICS Complies
NZIoC Complies

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
TCSI - Taiwan Chemical Substances Inventory
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
Formaldehyde (CAS #: 50-00-0)	0.1
Diammonium sulfate (CAS #: 7783-20-2)	1.0

SARA 311/312 Hazard Categories

Acute health hazard Yes
Chronic Health Hazard No
Fire hazard No
Sudden release of pressure hazard No
Reactive Hazard No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Formaldehyde 50-00-0	100 lb	-	-	X

CERCLA

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Formaldehyde 50-00-0	100 lb	100 lb	RQ 100 lb final RQ RQ 45.4 kg final RQ

U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

Chemical name	U.S. - Department of Homeland Security - Chemical Facility Anti-Terrorism Standards (CFATS) - Security Issues

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Formaldehyde (<0.1%) CAS#: 50-00-0	Release - Toxic (solution)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Formaldehyde (CAS #: 50-00-0)	Carcinogen



WARNING: This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer.

For more information, go to <http://www.P65Warnings.ca.gov>

IMERC: Not applicable

U.S. State Right-to-Know Regulations

This product may contain substances regulated by state right-to-know regulations.

Chemical name	New Jersey	Massachusetts	Pennsylvania
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	X	-	-
Sodium sulfate 7757-82-6	-	X	X
Formaldehyde 50-00-0	X	X	X
Diammonium sulfate 7783-20-2	-	X	X

U.S. EPA Label Information

Chemical name	FIFRA	FDA
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane	180.0910	-
Sodium sulfate	-	21 CFR 186.1797
Diammonium sulfate	180.0910	21 CFR 184.1143

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Special Comments

None

Additional information

Global Automotive Declarable Substance List (GADSL)

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
1,3,5,7-Tetraazatricyclo[3.3.1.1(3,7)]decane 100-97-0	Declarable Substance (FI)	0.1 %
Formaldehyde 50-00-0	Prohibited Substance (FI) Prohibited Substance (LR)	0.1 %

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	Declarable Substance (LR) Declarable Substance (FI)	

NFPA and HMIS Classifications

NFPA	Health hazards - 2	Flammability - 0	Instability - 0	Physical and chemical properties -
HMIS	Health hazards - 2 - *	Flammability - 0	Physical hazards - 0	Personal protection - X - I

Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	ACGIH (American Conference of Governmental Industrial Hygienists)
ATSDR	ATSDR (Agency for Toxic Substances and Disease Registry)
CCRIS	CCRIS (Chemical Carcinogenesis Research Information System)
CDC	CDC (Center for Disease Control)
CEPA	CEPA (Canadian Environmental Protection Agency)
CICAD	CICAD (Concise International Chemical Assessment Documents)
ECHA	ECHA (The European Chemicals Agency)
EEA	EEA (European Environment Agency)
EPA	EPA (Environmental Protection Agency)
ERMA	ERMA (New Zealand's Environmental Risk Management Authority)
ECOSARS	Estimation through ECOSARS v1.11 part of the Estimation Programs Interface (EPI) Suite™
FDA	FDA (Food & Drug Administration)
GESTIS	GESTIS (Information System on Hazardous Substances of the German Social Accident Insurance)
HSDB	HSDB (Hazardous Substances Data Bank)
INERIS	INERIS (The National Industrial Environment and Risks Institute)
IPCS INCHEM	IPCS INCHEM (International Programme on Chemical Safety)
IUCLID	IUCLID (The International Uniform Chemical Information Database)
NITE	Japan National Institute of Technology and Evaluation (NITE)
NIH	NIH (National Institutes of Health)
NIOSH	NIOSH (National Institute for Occupational Safety and Health)
LOLI	LOLI (List of Lists - An International Chemical Regulatory Database)
NDF	no data
NICNAS	Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH IDLH	Immediately Dangerous to Life or Health
OSHA	OSHA (Occupational Safety and Health Administration of the US Department of Labor)
PEEN	PEEN (Pan European Ecological Network)
RTECS	RTECS (Registry of Toxic Effects of Chemical Substances)
SIDS	SIDS (Screening Information Dataset) for High Volume Chemicals
SYKE	The Finnish Environment Institute (SYKE)
USDA	USDA (United States Department of Agriculture)
USDC	USDC (United States Department of Commerce)
WHO	WHO (World Health Organization)

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
MAC	Maximum Allowable Concentration	Ceiling	Ceiling Limit Value
X	Listed	Vacated	These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.

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SKN* Skin designation
RSP+ Respiratory sensitization
C Carcinogen
M mutagen

SKN+ Skin sensitization
** Hazard Designation
R Reproductive toxicant

Prepared By Hach Product Compliance Department

Issue Date 30-07-2019

Revision Date 26-Jan-2024

Revision Note None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY©2023

End of Safety Data Sheet

SAFETY DATA SHEET

Isobutylene

Airgas
an Air Liquide company

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 (ft³/lb)** : 6.6845
- Gas Density (lb/ft³)** : 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/m ³	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.)

Health	/ 1
Flammability	4
Physical hazards	3

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

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017**Revision :** 05/17/2017**Trade Name:** Liquinox**1 Identification of the substance/mixture and of the supplier****1.1 Product identifier****Trade Name:** Liquinox**Synonyms:****Product number:** Liquinox**1.2 Application of the substance / the mixture :** Cleaning material/Detergent**1.3 Details of the supplier of the Safety Data Sheet****Manufacturer**Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040**Supplier**

Not Applicable

Emergency telephone number:**ChemTel Inc**

North America: 1-800-255-3924

International: 01-813-248-0585

2 Hazards identification**2.1 Classification of the substance or mixture:**

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:Alcohol ethoxylate
Sodium alkylbenzene sulfonate
Sodium xylenesulphonate
Lauramine oxide**2.2 Label elements:**

Eye irritation, category 2A.

Skin irritation, category 2.

Hazard pictograms:**Signal word:** Warning**Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P501 Dispose of contents and container as instructed in Section 13.

Additional information: None.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017**Revision :** 05/17/2017**Trade Name:** Liquinox**Hazards Not Otherwise Classified (HNOC):** None**Information concerning particular hazards for humans and environment:**

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients**3.1 Chemical characterization :** None**3.2 Description :** None**3.3 Hazardous components (percentages by weight)**

Identification	Chemical Name	Classification	Wt. %
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	10-25
CAS number: 1300-72-7	Sodium Xylenesulphonate	Eye Irrit. 2; H319	2.5-10
CAS number: 84133-50-6	Alcohol Ethoxylate	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	2.5-10
CAS number: 1643-20-5	Lauramine oxide	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	1-2

3.4 Additional Information: None.**4 First aid measures****4.1 Description of first aid measures****General information:** None.**After inhalation:**

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox**4.3 Indication of any immediate medical attention and special treatment needed:**

No additional information.

5 Firefighting measures**5.1 Extinguishing media****Suitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None**5.2 Special hazards arising from the substance or mixture :**

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters**Protective equipment:**

Wear protective eye wear, gloves and clothing.

Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.

Avoid contact with skin, eyes and clothing.

6 Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures :**

Ensure adequate ventilation.

Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.

Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None**7 Handling and storage****7.1 Precautions for safe handling :**

Avoid breathing mist or vapor.

Do not eat, drink, smoke or use personal products when handling chemical substances.

Conditions for safe storage, including any incompatibilities:

Store closed upright and in a cool dry place, should be 15 - 30 deg C or 60 - 90 deg F.

7.2 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox

8 Exposure controls/personal protection



8.1 Control parameters :

No applicable occupational exposure limits

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	Pale yellow liquid	Explosion limit lower: Explosion limit upper:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	Vapor pressure at 20°C:	Not determined or not available.
Odor threshold:	Not determined or not available.	Vapor density:	Not determined or not available.
pH-value:	8.5 as is	Relative density:	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	Solubilities:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	Partition coefficient (n-octanol/water):	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	Auto/Self-ignition temperature:	Not determined or not available.
Evaporation rate:	Not determined or not available.	Decomposition temperature:	Not determined or not available.
Flammability (solid, gaseous):	Not determined or not available.	Viscosity:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017**Revision :** 05/17/2017**Trade Name:** Liquinox**Density at 20°C:** Not determined or not available.**10 Stability and reactivity****10.1 Reactivity :** None**10.2 Chemical stability :** None**10.3 Possibility hazardous reactions :** None**10.4 Conditions to avoid :** None**10.5 Incompatible materials :** None**10.6 Hazardous decomposition products :** None**11 Toxicological information****11.1 Information on toxicological effects :****Acute Toxicity:****Oral:**

: LD50 >5000 mg per kg Rat, Oral) - product .

Chronic Toxicity: No additional information.**Skin corrosion/irritation:**

Alcohol Ethoxylate: May cause mild to moderate skin irritation.

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

Lauramine oxide: Causes skin irritation.

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation.

Alcohol Ethoxylate: Causes moderate to severe eye irritation and conjunctivitis.

Sodium xylenesulphonate: Rabbit: irritating to eyes.

Lauramine oxide: Causes serious eye damage.

Respiratory or skin sensitization: No additional information.**Carcinogenicity:** No additional information.**IARC (International Agency for Research on Cancer):** None of the ingredients are listed.**NTP (National Toxicology Program):** None of the ingredients are listed.**Germ cell mutagenicity:** No additional information.**Reproductive toxicity:** No additional information.**STOT-single and repeated exposure:** No additional information.**Additional toxicological information:** No additional information.**12 Ecological information****12.1 Toxicity:**

Sodium Alkylbenzene Sulfonate: Fish: LC50 1.67 mg/l, 96 hours

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017**Revision :** 05/17/2017**Trade Name:** Liquinox

Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.

Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.

Lauramine oxide: Fish, LC0 24.3 mg/l, 96h [Killifish (Cyprinodontidae)]

Lauramine oxide: Aquatic invertebrates, (LC50): 3.6 mg/l 96 hours [Daphnia (Daphnia)].

Lauramine oxide: Aquatic plants, EC50 Algae 0.31 mg/l 72 hours [Algae]

Alcohol Ethoxylate: Aquatic invertebrates, (LC50): 4.01 mg/l 48 hours [Daphnia (daphnia)].

12.2 Persistence and degradability: No additional information.**12.3 Bioaccumulative potential:** No additional information.**12.4 Mobility in soil:** No additional information.**General notes:** No additional information.**12.5 Results of PBT and vPvB assessment:****PBT:** No additional information.**vPvB:** No additional information.**12.6 Other adverse effects:** No additional information.**13 Disposal considerations****13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)****Relevant Information:**

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class:	None
Label:	None
LTD.QTY:	None

US DOT

Limited Quantity Exception: None

Bulk:**RQ (if applicable):** None**Proper shipping Name:** None**Hazard Class:** None**Packing Group:** None**Marine Pollutant (if applicable):** No additional information.**Comments:** None**Non Bulk:****RQ (if applicable):** None**Proper shipping Name:** None**Hazard Class:** None**Packing Group:** None**Marine Pollutant (if applicable):** No additional information.**Comments:** None

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox	
I4.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
I4.5 Environmental hazards :	None
I4.6 Special precautions for user: Danger code (Kemler): EMS number: Segregation groups:	None None None None
I4.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.	
I4.8 Transport/Additional information: Transport category: Tunnel restriction code: UN "Model Regulation":	 None None None

I5 Regulatory information**I5.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.****North American**

SARA Section 313 (specific toxic chemical listings): None of the ingredients are listed. Section 302 (extremely hazardous substances): None of the ingredients are listed.
CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable Spill Quantity: None of the ingredients are listed.
TSCA (Toxic Substances Control Act): Inventory: All ingredients are listed. Rules and Orders: Not applicable.
Proposition 65 (California): Chemicals known to cause cancer: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed. Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed. Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.
Germany MAK: Not classified.

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Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox**Asia Pacific****Australia****Australian Inventory of Chemical Substances (AICS):** All ingredients are listed.**China****Inventory of Existing Chemical Substances in China (IECSC):** All ingredients are listed.**Japan****Inventory of Existing and New Chemical Substances (ENCS):** All ingredients are listed.**Korea****Existing Chemicals List (ECL):** All ingredients are listed.**New Zealand****New Zealand Inventory of Chemicals (NZOIC):** All ingredients are listed.**Philippines****Philippine Inventory of Chemicals and Chemical Substances (PICCS):** All ingredients are listed.**Taiwan****Taiwan Chemical Substance Inventory (TSCI):** All ingredients are listed.**16 Other information****Abbreviations and Acronyms:** None**Summary of Phrases****Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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 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.

NFPA: 1-0-0**HMIS:** 1-0-0

Safety Data Sheet

according to OSHA HCS (29CFR 1910.1200) and WHMIS 2015 Regulations

Revision: July 29, 2020

1 Identification

- **Product identifier**
- **Trade name:** ORP Standard, 240mV
- **Product code:** OR4240SS
- **Recommended use and restriction on use**
- **Recommended use:** Laboratory chemicals
- **Restrictions on use:** No relevant information available.
- **Details of the supplier of the Safety Data Sheet**
- **Manufacturer/Supplier:**
AquaPhoenix Scientific, Inc.
860 Gitts Run Road
Hanover, PA 17331 USA
Tel +1 (717)632-1291
Toll-Free: (866)632-1291
info@aquaphoenixsci.com
- **Distributor:**
AquaPhoenix Scientific
860 Gitts Run Road,
Hanover, PA 17331
(717) 632-1291
- **Emergency telephone number:**
ChemTel Inc.
(800)255-3924 (North America)
+1 (813)248-0585 (International)

2 Hazard(s) identification

- **Classification of the substance or mixture**
The product is not classified as hazardous according to the Globally Harmonized System (GHS).
- **Label elements**
- **GHS label elements** Not regulated.
- **Hazard pictograms:** Not regulated.
- **Signal word:** None.
- **Hazard statements:** Not regulated.
- **Other hazards** There are no other hazards not otherwise classified that have been identified.

3 Composition/information on ingredients

- **Chemical characterization:** Mixtures

- **Components:**

7732-18-5	Water	>90%
7447-40-7	Potassium chloride Eye Irrit. 2B, H320	<1%
13746-66-2	tripotassium hexacyanoferrate ⚠ Skin Irrit. 2, H315; Eye Irrit. 2A, H319	<1%
14459-95-1	Potassium ferrocyanide	<1%

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(Cont'd. of page 1)

· Additional information:

For the listed ingredient(s), the identity and/or exact percentage(s) are being withheld as a trade secret.
For the wording of the listed Hazard Statements, refer to section 16.

4 First-aid measures

· Description of first aid measures**· After inhalation:** Supply fresh air; consult doctor in case of complaints.**· After skin contact:**

Wash with soap and water.

If skin irritation is experienced, consult a doctor.

· After eye contact:

Remove contact lenses if worn.

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

· After swallowing:

Rinse out mouth and then drink plenty of water.

Do not induce vomiting; immediately call for medical help.

· Most important symptoms and effects, both acute and delayed:

Gastric or intestinal disorders when ingested.

Nausea in case of ingestion.

· Indication of any immediate medical attention and special treatment needed:

If medical advice is needed, have product container or label at hand.

5 Fire-fighting measures

· Extinguishing media**· Suitable extinguishing agents:**

The product is not flammable.

Use fire fighting measures that suit the environment.

· For safety reasons unsuitable extinguishing agents: No relevant information available.**· Special hazards arising from the substance or mixture**

Formation of toxic gases is possible during heating or in case of fire.

· Advice for firefighters**· Protective equipment:**

Wear self-contained respiratory protective device.

Wear fully protective suit.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

For large spills, wear protective clothing.

· Environmental precautions No special measures required.**· Methods and material for containment and cleaning up**

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Clean the affected area carefully; suitable cleaners are:

Warm water

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Send for recovery or disposal in suitable receptacles.

· **Reference to other sections**

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

7 Handling and storage

· **Handling**

· **Precautions for safe handling:**

Prevent formation of aerosols.

Avoid splashes or spray in enclosed areas.

Use only in well ventilated areas.

· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**

· **Requirements to be met by storerooms and receptacles:**

Store in cool, dry conditions in well sealed receptacles.

· **Information about storage in one common storage facility:** Store away from foodstuffs.

· **Specific end use(s)** No relevant information available.

8 Exposure controls/personal protection

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**

The following constituent is the only constituent of the product which has a PEL, TLV or other recommended exposure limit.

13746-66-2 tripotassium hexacyanoferrate

PEL (USA)	Long-term value: 5 mg/m ³ as CN; Skin
REL (USA)	Long-term value: 1 mg/m ³ as Fe
TLV (USA)	Long-term value: 1 mg/m ³ as Fe
LMPE (Mexico)	Long-term value: 1 mg/m ³ como Fe

· **Exposure controls**

· **General protective and hygienic measures:**

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands and face after working with the substance.

Do not inhale dust / smoke / mist.

Avoid contact with the eyes and skin.

· **Engineering controls:** No relevant information available.

· **Breathing equipment:**

Use suitable respiratory protective device when aerosol or mist is formed.

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For spills, respiratory protection may be advisable.

· **Protection of hands:**



Protective gloves

· **Eye protection:**



Safety glasses

Follow relevant national guidelines concerning the use of protective eyewear.

· **Body protection:**

Protective work clothing

Protection may be required for spills.

· **Limitation and supervision of exposure into the environment** No special requirements.

· **Risk management measures** No special requirements.

9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **Appearance:**

Form: Liquid

Color: Not determined.

· **Odor:** Not determined.

· **Odor threshold:** Not determined.

· **pH-value:** Not determined.

· **Melting point/Melting range:** Not determined.

· **Boiling point/Boiling range:** 105-110 °C (221-166 °F)

· **Flash point:** The product is not flammable.

· **Flammability (solid, gaseous):** Not applicable.

· **Auto-ignition temperature:** Not determined.

· **Decomposition temperature:** Not determined.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Explosion limits**

Lower: Not determined.

Upper: Not determined.

· **Oxidizing properties:** Not determined.

· **Vapor pressure:** Not determined.

· **Density:**

Relative density: Not determined.

Vapor density: Not determined.

Evaporation rate: Not determined.

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· Solubility in / Miscibility with Water:	Soluble.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Other information	No relevant information available.

10 Stability and reactivity

- **Reactivity:** No relevant information available.
- **Chemical stability:** Stable under normal temperatures and pressures.
- **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
To avoid thermal decomposition, do not overheat.
- **Possibility of hazardous reactions**
Toxic fumes may be released if heated above the decomposition point.
Reacts with strong alkali.
Contact with acids releases toxic gases.
Reacts with strong oxidizing agents.
- **Conditions to avoid** Excessive heat.
- **Incompatible materials** Oxidizers, strong bases, strong acids
- **Hazardous decomposition products**
Under fire conditions only:
Toxic metal oxide smoke
Chlorine
Hydrogen cyanide (prussic acid)

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:** Based on available data, the classification criteria are not met.
- **LD/LC50 values that are relevant for classification:** None.
- **Primary irritant effect:**
- **On the skin:** Based on available data, the classification criteria are not met.
- **On the eye:** Based on available data, the classification criteria are not met.
- **Sensitization:** Based on available data, the classification criteria are not met.

· IARC (International Agency for Research on Cancer):

None of the ingredients are listed.

· NTP (National Toxicology Program):

None of the ingredients are listed.

· OSHA-Ca (Occupational Safety & Health Administration):

None of the ingredients are listed.

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- **Probable route(s) of exposure:**
Ingestion.
Inhalation.
Eye contact.
Skin contact.
- **Germ cell mutagenicity:** Based on available data, the classification criteria are not met.
- **Carcinogenicity:** Based on available data, the classification criteria are not met.
- **Reproductive toxicity:** Based on available data, the classification criteria are not met.
- **STOT-single exposure:** Based on available data, the classification criteria are not met.
- **STOT-repeated exposure:** Based on available data, the classification criteria are not met.
- **Aspiration hazard:** Based on available data, the classification criteria are not met.

12 Ecological information

- **Toxicity**
- **Aquatic toxicity** The product contains materials that are harmful to the environment.
- **Persistence and degradability** No relevant information available.
- **Bioaccumulative potential:** No relevant information available.
- **Mobility in soil:** No relevant information available.
- **Additional ecological information**
- **General notes:**
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
The product contains materials that are harmful to the environment.
- **Other adverse effects** No relevant information available.

13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:**
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.
- **Uncleaned packagings**
- **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· UN-Number	
· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· UN proper shipping name	
· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· Transport hazard class(es)	

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· DOT, ADR/RID/ADN, IMDG, IATA	
· Class	Not regulated.
· Packing group	
· DOT, ADR/RID/ADN, IMDG, IATA	Not regulated.
· Environmental hazards	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
- United States (USA)
- SARA

· Section 302 (extremely hazardous substances):

None of the ingredients are listed.

· Section 313 (Specific toxic chemical listings):

13746-66-2 | tripotassium hexacyanoferrate

· TSCA (Toxic Substances Control Act)

Contact manufacturer for further information.

· Proposition 65 (California)

· Chemicals known to cause cancer:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity for females:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity for males:

None of the ingredients are listed.

· Chemicals known to cause developmental toxicity:

None of the ingredients are listed.

· EPA (Environmental Protection Agency):

13746-66-2 | tripotassium hexacyanoferrate

II

· IARC (International Agency for Research on Cancer):

None of the ingredients are listed.

· Canadian Domestic Substances List (DSL):

Contact manufacturer for further information.

*

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Trade name: ORP Standard, 240mV

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16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Abbreviations and acronyms:

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

CAS: Chemical Abstracts Service (division of the American Chemical Society)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

OSHA: Occupational Safety & Health Administration

Skin Irrit. 2: Skin corrosion/irritation – Category 2

Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A

Eye Irrit. 2B: Serious eye damage/eye irritation – Category 2B

· Sources

Website, European Chemicals Agency (echa.europa.eu)

Website, US EPA Substance Registry Services (ofmpub.epa.gov/sorinternet/registry/substreg/home/overview/home.do)

Website, Chemical Abstracts Registry, American Chemical Society (www.cas.org)

Patty's Industrial Hygiene, 6th ed., Rose, Vernon, ed. ISBN: 978-0-470-07488-6

Casarett and Doull's Toxicology: The Basic Science of Poisons, 8th Ed., Klaasen, Curtis D., ed., ISBN: 978-0-07-176923-5.

Safety Data Sheets, Individual Manufacturers

SDS Prepared by:

ChemTel

1305 North Florida Avenue

Tampa, Florida USA 33602-2902

Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573

Website: www.chemtel.com

Attachment 4

Incident Report Forms

Check oneInitial Report: ☐Update: ☐Final Report: ☐ ____**INCIDENT ANALYSIS REPORT (IAR)****MACTEC****Confidential - Privileged****Incident Potential Severity**

Letter: Select One

Number: Select One

Investigation Level: Select One

[Severity Matrix \(LINK\)](#)

Group: Select One Group HSE Manager: ____ Incident Review Panel Team (if applicable): ____

Incident Date: ____ Report Date: ____ Incident Assigned to: Select One

Section 1 – General InformationEmployee Name: ____ Sex: ☐ M ☐ F Date of Birth: ____ or Age Range: Select OneJob Position: Select One Hire Date: ____ Time employee began work: ____ Time of incident: ____ ☐ am | ☐ pm

Business Line: Select One Department Number: ____ Project Manager: ____

Project Name: ____ Project Number: ____ Client: ____

Employee home office: ____ State/Province: ____ Immediate Supervisor: ____ Hours employee worked during last 7 days: ____ hrs

Location: Select One Is this a Company controlled work site: ☐ Yes ☐ No Location description: ____**Section 2 – Incident Type - Process** (mark at least ONE BOLD TYPE and all that apply)

- ☐ **Fatality**
☐ **Environmental**
☐ **Injury/Illness Incident** If Injury/illness: Select One
- ☐ **Security**
☐ **Near Miss/Hazard ID**
☐ **Property Damage** If Damage: Select One ☐ 3rd Party?
- ☐ Hospitalization
 ☐ **Regulatory Inspection**
☐ **Notice of Violation or Citation** ☐ Agency Reportable
- ☐ Motor Vehicle Incident Involving Injury
 ☐ Other (describe): ____

Outcome/Result: Select One If "other", specify: ____ Source of Hazard: Select One If "other", specify: ____

Immediate Cause: Select One

A. If **injury/illness**: Indicate the part of the body: Select One If "other", specify: ____

Indicate body part location: Select One If "other", specify: ____

Injury Type: Select One If "other" specify: ____ Illness Type: Select One If "other", specify: ____

☐ Bleeding? Select One If yes, "First Aider" name: ____ ☐ Contact with blood/infectious material? Select One

Exposure Control Precautions taken by First Aider (check all that apply):

☐ None (If none, contact WorkCare)	☐ Gloves	☐ Previous HBV Immunization
☐ Immediate Personal Hygiene	☐ One-way CPR valve	☐ Recommended for HBV Immunization
☐ Eye protection	☐ Face mask	☐ Other (describe): ____

☐ Blood contaminated work area / surface? If contaminated, describe cleanup/disposal: ____☐ Medical treatment provided (i.e. prescriptions, referrals, etc.). If medical treatment, describe: ____☐ Physical limitations received from physician? If limitations, describe: ____ ☐ Modified Work Offer provided.☐ Second medical opinion? If second opinion, describe: ____☐ Workers Compensation claim filed? If filed, claim number: ____B. If **property damage**: describe what happened and estimate (\$) of damage to all objects involved? ____C. If **environmental**: Environmental incident category: ☐ Pollution Event ☐ Non-conformance

Was Regulatory Action Taken: Select One If "Yes" describe: ____

Type of pollution event: Select One Type of substance: Select One Name, CAS#, physical state: ____

Quantity: ____ Substance Unit: Select One Source of release: Select One If "other", specify: ____

Duration of Breach: Select One Receiving Environment: Select One If "other", specify: ____

Level of Non-conformance: Select One Describe Non-conformance: ____

- D. If **security**: Security Incident Type: Select One If Physical: Select One If Criminal: Select One If Intellectual: Select One
- E. If an **inspection by a regulatory agency**, what agency, who were the inspectors, inspector contact information? ____

Section 3 – Incident Description

Attach and number additional pages, as needed, to ensure all details related to the incident are captured.

- A. List the names of all persons involved in the incident, and employer information: ____
- B. List the names of any witnesses, their employer, and a local/company telephone number or address: ____
- C. Name of Employee's supervisor: ____ Contact phone number for supervisor: ____
- D. What specific job/task or action was the employee(s) doing just prior to the incident: ____
- E. Was a tool or equipment involved? ☐ Yes ☐ No What was it: ____ Last Inspection Date: ____ Defects: ____
- F. Explain in **detail** what happened: ____
- G. Explain in **detail** what object or substance directly harmed the employee: ____
- H. What were the weather conditions at time of incident?: ____
- I. What was the lighting like at time of incident? Bright ☐ Shadows ☐ Dark ☐ Other: ____
- J. List any damaged equipment or property (other than motor vehicles). Provide model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable: ____

Section 4 - Incident Analysis

- A. Was a Health and Safety Plan (HASP) or Activity Hazard Analysis (AHA) completed for the work being performed? ☐ Yes ☐ No
If "yes", Who prepared the document?: ____
- B. Who and when was the last manager (Project, Unit, etc.) at the site of the incident?: ____
- C. When and what safety training **directly related** to the incident has the person(s) involved had?: ____
- D. List attached documentation (HASP acknowledgement forms, kickoff/daily/weekly meetings, inspections, photographs): ____

Section 5 - Incident Investigation Results and Corrective Actions

This section to be completed by the HSE Manager/IRP with support from location where incident occurred, in accordance with [A-Z List of Accident Causes](#) and [Glossary of A-Z Causes](#) (click links).

Causal Factors (Acts or Omissions / Conditions)			
(Attach and number any additional pages as needed to completely address this section)			
	IMMEDIATE CAUSE	IMMEDIATE CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____
2	Select One	_____	_____
3	Select One	_____	_____
4	Select One	_____	_____
Root Cause(s) Analysis - The below items represents major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by the applicable Group HSE Manager / IRP.			
	ROOT CAUSE TYPE	ROOT CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____

2	Select One	_____	_____
3	Select One	_____	_____
4	Select One	_____	_____

Life Saving Rules and Safety Essentials (click links).

Life Saving Rules Select all applicable breaches of rules or ☐ None		Safety Essentials Select all applicable breaches of behavioral expectations or ☐ None	
☐ Confined Space ☐ Working at Height ☐ Permit to Work ☐ Isolations (energy) ☐ Dropped Objects (height) ☐ Excavations	☐ Personal Security ☐ Moving and Energized Equipment ☐ Working over or close to water ☐ Overhead electricity ☐ Driving ☐ Suspended Loads	☐ Always Take Care ☐ Follow the Rules ☐ Do a Risk Assessment	☐ You Must Intervene ☐ Manage Any Change ☐ Wear the Correct PPE

Corrective Actions

Root Cause #	Corrective Actions Taken (Attach additional pages as needed to completely address this section)	Responsible Person	Proposed Completion Date	Closed on Date	Verified by and Date Verified
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Section 6 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

Auto Insurance Carrier was called ☐ HSE Manager Notified ☐
 WorkCare was called ☐ Post-incident Drug/Alcohol Testing Performed ☐

Incident Report prepared by: _____

Employee (s): _____	Date: _____	Employee's Supervisor: _____	Date: _____
HSE Coordinator/Project/Unit Manager: _____	Date: _____	Group HSE Manager: _____	Date: _____

VEHICLE INCIDENT REPORT (VIR)

M ACTEC

Confidential - Privileged

Section 1 - General Information

Date of Incident: _____

Time incident occurred: _____ ☐ am | ☐ pm | Illumination: ☐ Dark ☐ Dusk ☐ Light | Road Condition: ☐ Dry ☐ Wet ☐ Icy/snow

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #: _____ Officer's Name: _____ Officer's Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L #: _____ State: _____

Driver's home office address: _____ Driver's Phone #: _____

Company Vehicle #: _____ Year: _____ Model: _____ License #: _____ State: _____

Company car?: ☐ Yes ☐ No Personal Vehicle?: ☐ Yes ☐ No Rental Vehicle?: ☐ Yes ☐ No

If rental, rented from: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage to vehicle: _____

Was an employee injured?: ☐ Yes ☐ No If yes, please describe: _____

Injuries to others?: ☐ Yes ☐ No If yes, please describe: _____

Vehicle was being used for: _____ Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed?: ☐ Yes ☐ No If yes, by whom?: _____ To Where?: _____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L #: _____ State: _____

Current address: _____ City: _____ State: _____

Telephone: _____ Work: _____ Cell: _____

Registered Owner's Name: _____ Address: _____ City: _____ State: _____

(verify registration document)

The Other Vehicle: Make: _____ Model: _____ Year: _____ License #: _____ State: _____

Insurance company name: _____ Address: _____ Phone #: _____

Policy No.: _____ Contact Person: _____ Phone #: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage: (Make note of pre-existing damage and take pictures if possible – you may attach additional pages if necessary): _____

Injuries to other driver/passengers: _____

Section 4 – Approvals (signatures required)

Form completed by (please print): _____ Date: _____

Office/Project Manager (please print): _____ Date: _____

Signature: _____

Signature: _____

Things to Do First In The Event Of a Motor Vehicle Incident

GENERAL INFORMATION

1. Do not decide on your own whether a particular incident is “covered” by insurance. Should there be any doubt, it is always preferable to report an occurrence, as this will allow Insurers/Group Insurance to determine if a covered loss has taken place.
2. Policy Conditions do require that all losses and occurrences, which may result in a claim be promptly reported.
3. Do not admit liability or offer your opinion on liability to anyone.
4. Complete this IAR/VIR form promptly and forward with all applicable supporting documentation. It is essential both division and location information be provided.
5. For automobile collisions within the **United States**, please indicate on the IAR form that you have contacted our Fleet Management Vendor, Donlen, at:

Donlen Hotline: 1-800-377-3192
Select Prompt “3” for accident management
24 hours a day, 7 days a week

6. For automobile collisions within **Canada**, please indicate on the IAR form that you have contacted the Control Adjuster and Group Insurance at:

Crawford Adjusters Canada - Claims Alert
1-888-218-2346
Email: newcrawfordclaims@crawco.ca
Copy: claims.insurance@woodgroup.com
Copy: amecfwinsurance@amecfw.com
24 hours a day, 7 days a week

Some provinces (BC, SK, MB) require incidents involving owned or leased vehicles also be reported to the Provincial Agency (Except for 1) Special lease agreements; 2) Third Party injury accidents; 3) Rented vehicles)

7. Information on the use of rental and personal vehicles at work and insurance are at the links for **Canada** and **US**.

The more details you have the better but, don't delay reporting if you don't have all of the information - that may be obtained later. A trained operator will answer your call and ask for all relevant information regarding the incident, and follow-up to obtain any additional information. The initial information required includes:

- Entity Name, Address & Location/Site Code – advise that you are a Wood company, E&IS
- Contact details of the person reporting the incident
- Wood vehicle details -i.e. license plate/serial number/make and model
- Injury details (if applicable)
- Driver & passenger details
- Date, location and circumstances of the accident
- Damage to your vehicle/Location of the vehicle/whether the vehicle is mobile or immobile
- Witness details
- The number of the Police Officer (if applicable) who is dealing with the incident and the name of his Police Station
- Details of the third party (if applicable) including
 - a. Name, address and telephone number
 - b. Vehicle details, License number, make and model
 - c. Insurance company, policy number, address and telephone number.
 - d. Name, address and telephone number of any passengers.
 - e. Details of injuries/Hospital to which they have been taken. information (i.e., name, phone number, address, vehicle information, insurance information)

Call 911 if there are serious injuries!

If you are injured or think you were injured, contact your supervisor and call WorkCare at 888-449-7787. Your supervisor will notify your HSE Coordinator and your Group HSE Manager. For additional instructions on what to do, go to E&IS HSE website at:

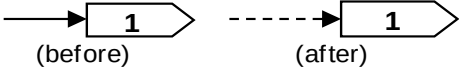
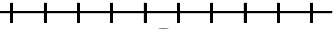
http://ee.amecnet.com/she/sheweb/incident_reporting.htm

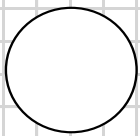
1. **Call for an officer if the incident occurred on public property** (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the collision, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
2. **Complete the Incident Investigation Report and the Vehicle Incident Report forms**. It is important that both these forms are completed in detail. Include a diagram of the incident on the provided sheet. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
3. **Give only information that is required by the authorities or as directed by Wood** contractual requirements.
4. **Sign only those statements required by the authorities or as directed by Wood** contractual requirements. Do not sign away your or the company's rights.

Vehicle Incident Diagram

This or a similar diagram must be completed with all VIRs

Instructions:

1. Number each vehicle and show directions → 
2. Use a solid line to show path before incident and use a dotted line to show path after incident

(before) (after)
3. Show pedestrian/non-motorist by: 
4. Show railroad by: 
5. Indicate north by arrow as: 
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.



Indicate North
by Arrow

Prepared by: _____

Date: _____

GROUND DISTURBANCE INCIDENT REPORT (GDR) MACTEC

Section 1 – General Information

Employee Name: _____ Time of incident: _____ ☐ am | ☐ pm Time Reported: _____ ☐ am | ☐ pm Report Date: _____
Project Name: _____ Project Number: _____ Client: _____

List of All Parties Present

Name	Company	Telephone No.	Role
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Describe the chronological description of the incident and response: _____

Section 2 – Date and Location of Event

A. *Date of Event: _____ (MM/DD/YYYY)			
B. *Country	*State	*County	City
C. Street address		Nearest Intersection	
D. *Right of Way where event occurred			
E. Public:	☐ City Street	☐ State Highway	☐ County Road ☐ Interstate Highway ☐ Public-Other
F. Private:	☐ Private Business	☐ Private Land Owner	☐ Private Easement
G.	☐ Pipeline	☐ Power /Transmission Line	☐ Dedicated Public Utility Easement
	☐ Federal Land	☐ Railroad	☐ Data not collected ☐ Unknown/Other

List attached documentation (Public Utility Locates, Private Utility Locates, Copy of notifications submitted to Owner or other utility Owners, photographs): _____

Section 3 – Affected Facility Information

*What type of facility operation was affected?			
☐ Cable Television	☐ Electric	☐ Natural Gas	☐ Liquid Pipeline
☐ Steam	☐ Telecommunications	☐ Water	☐ Sewer (Sanitary Sewer)
☐ Unknown/Other			
*What type of facility was affected?			
☐ Distribution	☐ Gathering	☐ Service/Drop	☐ Transmission
☐ Unknown/Other			
Was the facility part of a joint trench?			
☐ Unknown	☐ Yes	☐ No	
Was the facility owner a member of One-Call Center?			
☐ Unknown	☐ Yes	☐ No	

Section 4 – Excavation Information

*Type of Excavator

☐ Contractor	☐ County	☐ Developer	☐ Farmer	☐ Municipality	☐ Occupant
☐ Railroad	☐ State	☐ Utility	☐ Data not collected	☐ Unknown/Other	

*Type of Excavation Equipment

☐ Auger	☐ Backhoe/Trackhoe	☐ Boring	☐ Drilling	☐ Directional Drilling
☐ Explosives	☐ Farm Equipment	☐ Grader/Scraper	☐ Hand Tools	☐ Milling Equipment
☐ Probing Device	☐ Trencher	☐ Vacuum Equipment	☐ Data Not Collected	☐ Unknown/Other

*Type of Work Performed

☐ Agriculture	☐ Cable Television	☐ Curb/Sidewalk	☐ Bldg. Construction	☐ Bldg. Demolition
☐ Drainage	☐ Driveway	☐ Electric	☐ Engineering/Survey	☐ Fencing
☐ Grading	☐ Irrigation	☐ Landscaping	☐ Liquid Pipeline	☐ Milling
☐ Natural Gas	☐ Pole	☐ Public Transit Auth.	☐ Railroad Maint.	☐ Road Work
☐ Sewer (San/Storm)	☐ Site Development	☐ Steam	☐ Storm Drain/Culvert	☐ Street Light
☐ Telecommunication	☐ Traffic Signal	☐ Traffic Sign	☐ Water	☐ Waterway Improvement
☐ Data Not Collected	☐ Unknown/Other			

Section 5 – Pre-Excavation Notification

*Was the One-Call Center notified?

- ☐ Yes ☐ No If Yes, which One-Call Center?

Ticket number:

Was Private Contract Locator used?

- ☐ Yes ☐ No

Section 6 – Locating and Marking

*Type of Locator

- ☐ Utility Owner ☐ Contract Locator ☐ Data Not Collected

*Were facility marks visible in the area of excavation?

- ☐ Yes ☐ No ☐ Data Not Collected

*Were facilities marked correctly?

- ☐ Yes ☐ No ☐ Data Not Collected

What technology was used to locate utilities?

☐ Maps	☐ Active(transmitter+receiver)	☐ Passive (receiver only)	☐ GPR
☐ Acoustic	☐ Magnetic	☐ Infrared	☐ Unknown/Other

What Factors affected the ability to locate services?

☐ Soil Type:_____	☐ Non-Grounded	☐ Common Bonded	☐ Depth
☐ Electromagnetic interference	☐ Parallel facilities	☐ Congested facilities	☐ Unknown/Other

Section 7 – Excavator Downtime

Did Excavator incur down time?

- ☐ Yes ☐ No

If yes, how much time?

- ☐ Unknown ☐ Less than 1 hour ☐ 1 hour ☐ 2 hours ☐ 3 or more hours Exact Value _____ If

Estimated cost of down time?

☐ Unknown	☐ \$0	☐ \$1 to 500	☐ \$501 to 1,000	☐ \$1,001 to 2,500	☐ \$2,501 to 5,000
	☐ \$5,001 to 25,000	☐ \$25,001 to 50,000	☐ \$50,001 and over	Exact Value _____	

Section 8 – Description of Damage

*Was there damage to a facility?

☐ Yes ☐ No (i.e. near miss)

*Did the damage cause an interruption in service?

☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown/Other

If yes, duration of interruption

☐ Unknown ☐ Less than 1 hour ☐ 1 to 2 hrs ☐ 2 to 4 hrs ☐ 4 to 8 hrs ☐ 8 to 12 hrs ☐ 12 to 24 hrs

☐ 1 to 2 days ☐ 2 to 3 days ☐ 3 or more days ☐ Data Not Collected Exact Value _____

Approximately how many customers were affected?

☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 10 ☐ 11 to 50 ☐ 51 or more Exact Value _____

Estimated cost of damage / repair/restoration

☐ Unknown ☐ \$0 ☐ \$1 to 500 ☐ \$501 to 1,000 ☐ \$1,001 to 2,500 ☐ \$2,501 to 5,000
☐ \$5,001 to 25,000 ☐ \$25,001 to 50,000 ☐ \$50,001 and over Exact Value _____

Number of people injured

☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____

Number of fatalities

☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____

Was there a Product Release?

Product Release: ☐ No ☐ Yes ☐ N/A

Type: _____ If Yes, Incident Type is Environmental

Report.

Volume: _____ Spill Controls: _____

Repair Process: _____

Section 9 – Description of the Root Cause [Link to GDR Root Cause Tip Card](#)

Please choose one

One-Call Notification Practices Not Sufficient

- ☐ No notification made to the One-Call Center
- ☐ Notification to one-call center made, but not sufficient
- ☐ Wrong information provided to One Call Center

Locating Practices Not Sufficient

- ☐ Facility could not be found or located
- ☐ Facility marking or location not sufficient
- ☐ Facility was not located or marked
- ☐ Incorrect facility records/maps

Excavation Practices Not Sufficient

- ☐ Failure to maintain marks
- ☐ Failure to support exposed facilities
- ☐ Failure to use hand tools where required
- ☐ Failure to test-hole (pot-hole)
- ☐ Improper backfilling practices
- ☐ Failure to maintain clearance
- ☐ Other insufficient excavation practices

Miscellaneous Root Causes

- ☐ One-Call Center error
- ☐ Abandoned facility
- ☐ Deteriorated facility
- ☐ Previous damage
- ☐ Data Not Collected
- ☐ Other

Provide explanation of selected root cause/s: _____

Section 10 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

One Call was called ☐ Spills Reporting Agency Notified ☐

Emergency Responders (Fire) was called ☐ Post-incident Drug/Alcohol Testing Performed

List of All Agencies Contacted

Name/Agency	Phone #	Date	Time

Incident Report prepared by: _____

Employee (s): _____	Date: _____	Employee's Supervisor: _____	Date: _____

HSE Coordinator/Project/Unit Manager: _____	Date: _____	Group HSE Manager: _____	Date: _____

**APPENDIX B-
FIELD INVESTIGATION SOPs**

SOP 01 Drinking Water Well Sampling

SOP 02 Water Level Measurement

SOP 03 Low Flow Groundwater Sampling

SOP 06 PFAS Protocols

SOP 07 Surface Water Sampling

SOP 08 Chain of Custody Procedures

SOP 10 Sediment Sampling

SOP 11 Soil Description and Identification

SOP 13 Soil Sampling

SOP 16 Drilling Oversight

SOP 17 Direct Push Sampling

SOP 18 Sonic Drilling

SOP 20 Heavy Equipment Decontamination

SOP 21 Field Equipment Decontamination

SOP 23 Monitoring Well Development

SOP # S1

EEEG STANDARD OPERATING PROCEDURE #S1

DRINKING WATER SAMPLING FROM PRIVATE AND PUBLIC SUPPLY WELLS

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Chuck Staples, PG, Program Technical Lead

August 31, 2025

Date

Reviewed

Date

DRINKING WATER SAMPLING FROM PRIVATE AND PUBLIC SUPPLY WELLS

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes guidelines and procedures by which EEEG personnel should conduct drinking water sampling at private and public supply wells for chemical analysis. Proper procedures are necessary to assure the quality and integrity of supply water analytical results. Construction and operation of supply wells will vary; therefore, this SOP may not be applicable to all situations.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure should be documented in the field logbook and/or field data record.

2.0 REFERENCES

U.S. Environmental Protection Agency (EPA), 2019. Laboratory Services and Applied Science Division Operating Procedure: Potable Water Supply Sampling. ASBPROC-305-R4. Effective date June 11, 2019.

3.0 DEFINITIONS

Private Water Supply Well – A well that serves as a drinking water system and is not regulated.

Public Water Supply Well – A well and distribution system that is regulated by a government entity and must be sampled regularly to ensure the water is safe to drink.

Potable Water – A liquid that is suitable for drinking.

4.0 PROCEDURE

This section contains both the responsibilities and protocol for sampling private and public supply wells. Proper procedures are necessary to ensure the quality and integrity of the samples.

4.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures. The PM will select the appropriate sampling methodology and analytical program based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to supply well sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and documenting the deviation in the field logbook.

4.2 Preparation

Office Procedures

1. Ensure that the project manager or NYSDEC has acquired permission from the property owner or residence to collect the supply well sample.
2. Contact the well owner with the proposed schedule for sampling, and coordinate with the well owner on timing; obtain information on the pumping rate and frequency during the last several weeks, if available.
3. Review pertinent information with regards to well construction, development, and sampling information on the wells to be tested, if available.
4. Assemble appropriate logbooks and field data records to complete the field assignment.

Sampling Considerations

This SOP assumes that private or public supply wells are equipped with operational pumps and plumbing to purge the mechanical systems and collect samples. If the mechanical systems for supply wells are not operational, then the sampling should be conducted using Low Flow Groundwater Sampling Procedures.

The following should be considered when choosing the location to collect a potable water sample from a private and/or public water supply well (EPA, 2019):

- Sample locations selected should be supplied with water from a service pipe connected directly to a water main in the segment of interest.

- Whenever possible, choose the tap closest to the water source, and prior to the water lines entering the residence, office, building, etc., and prior to any holding or pressurization tanks.
- The sampling tap must be protected from exterior contamination associated with being too close to a sink bottom or to the ground. Contaminated water or soil from the faucet exterior may enter the bottle during the collection procedure because it is difficult to place a bottle under a low tap without grazing the neck interior against the outside faucet surface. If the tap is too close to the ground for direct collection into the appropriate sample container, it is acceptable to use a smaller container to transfer sample to a larger container.
- When filling any sample container, care should be taken that splashing drops of water from the ground or sink do not enter the bottle or cap.
- Leaking taps that allow water to discharge from around the valve stem handle and down the outside of the faucet or taps in which water tends to run up on the outside of the lip are to be avoided as sampling locations.
- Disconnect any hoses, filters, or aerators attached to the tap before sampling. These devices can harbor a bacterial population if they are not routinely cleaned or replaced when worn or cracked.
- Taps where the water flow is not constant should be avoided because temporary fluctuation in line pressure may cause clumps of microbial growth that are lodged in a pipe section or faucet connection to break loose. A smooth flowing water stream at moderate pressure without splashing should be used. The sample should be collected without changing the water flow.

Data Form

The Water Grab Sample Field Data Record shall be used to record sampling information and observations (**example Attached**). All entries shall be made in indelible ink.

4.3 Field Procedures

Private and public supply well samples will be collected by filling sample containers from a tap, sample port or spigot.

Private drinking water sampling:

1. Don gloves.
2. Evaluate the water supply system for the presence of treatment systems (e.g. carbon filters, sediment filters, water softeners). If a treatment system is identified select a sampling location before the treatment system.
3. If the sampling location is at a faucet evaluate if an aerator is present and remove prior to sampling.
4. Purge water at the sampling point until sufficient volume has been purged to ensure the water collected is from the well. This is generally 10 minutes of purging or until the well pump turns on.
5. Collect samples in laboratory-supplied containers.
6. Follow standard sample handling and custody procedures to contain and transport samples to the off-site laboratory.

Public Drinking Water Supply Sampling:

1. Don gloves.
2. Identify the sampling location closest to the well head and prior to treatment systems and storage tanks. Typically, this will be the location where the system owner collects regulatory compliance samples.
3. Purging the system may not be necessary if the location selected is in line with the direct delivery system and water is continuously pumped from the well. If the sampling location is not in direct line with the delivery system purge sufficient water to clear potentially stagnant water.
4. Collect samples in laboratory-supplied containers.
5. Follow standard sample handling and custody procedures to contain and transport samples to the off-site laboratory.

5.0 ATTACHMENTS

Drinking Water Grab Sampling Record

DRINKING WATER SAMPLING FIELD DATA RECORD

PROJECT NAME	Sampler Signature:	Print Name:
PROJECT NUMBER	Checked By:	Date:

Owner:

Address:

LOCATION ID	SAMPLE TAP LOCATION	PURGE START TIME (minimum 10 min.)	WATER TREATMENT SYSTEM Yes / No
SAMPLE ID	SAMPLE DATE	PURGE END TIME/ SAMPLE TIME	Comment:

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED

Owner:

Address:

LOCATION ID	SAMPLE TAP LOCATION	PURGE START TIME (minimum 10 min.)	WATER TREATMENT SYSTEM Yes / No
SAMPLE ID	SAMPLE DATE	PURGE END TIME/ SAMPLE TIME	Comment:

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED

Owner:

Address:

LOCATION ID	SAMPLE TAP LOCATION	PURGE START TIME (minimum 10 min.)	WATER TREATMENT SYSTEM Yes / No
SAMPLE ID	SAMPLE DATE	PURGE END TIME/ SAMPLE TIME	Comment:

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED

SOP # S2

EEEG STANDARD OPERATIONG PROCEDURE #S2

WATER LEVEL MEASUREMENT AND MONITORING WELL CONDITION EVALUATION
PROCEDURES

August 31, 2025

NYSDEC Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 29, 2025
Date

Review

Date

WATER LEVEL MEASUREMENT AND MONITORING WELL CONDITION EVALUATION PROCEDURES

1.0 PURPOSE

This Standard Operating Procedure (SOP) was prepared to direct field personnel in the methods for measuring water levels in and evaluating the condition of monitoring wells during field investigations at hazardous and non-hazardous waste sites. The objective of water level measurements is to gain accurate measurements (to within 0.01 feet [ft]) of the depth of ground water for use during well installation, use in preparation of groundwater elevation contour maps, slug tests, packer tests, and pumping tests.

Deviation from this procedure in planning or in the execution of planned activities must be approved by the project manager and documented in the field logbook and/or field data record.

2.0 PROCEDURE

2.1 Responsibilities

Project Manager

The project manager (PM) is responsible for determining the appropriate water level measurement procedures based on the sampling program objectives

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to water level measurement activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and documenting the deviation in the field logbook and/or field data record.

2.2 Preparation

Office preparation

1. Review pertinent information with regards to well construction, development, and sampling information on the wells to be measured, if available.

2. Assemble appropriate logbooks and field data records to complete the field assignment.
3. Make copies of field data records with water level measurements and the description of monitoring well conditions from the previous sampling event, if available.

Equipment Selection and Sampling Considerations

The following list of equipment may be utilized during water level measurements. Site-specific conditions may warrant the use of additional or deletion of items from this list.

- Electronic water level indicators – graduated with an engineer’s scale at 0.01 ft intervals
- Tap water or Deionized water
- Alconox®, Liquinox® or other non-phosphate concentrated laboratory grade soap
- Pump sprayer
- Pint sized squeeze bottles
- Any necessary personal protective equipment (gloves, eyewear, Tyvek® suits)
- Air monitoring instruments as required (PID or FID as specified in HASP)
- Field logbook
- Monitoring well inventory and/or water level field data records (site specific as needed)
- Well keys
- Previous measurement data (if available)
- Oil/water interface probe (if necessary)
- Engineer’s rule
- Additional weight on tape if required

2.3 Field Procedures

Site-specific conditions may warrant the use of stringent air monitoring and potentially more significant decontamination scenarios.

- Record the condition of the well (protective casing, concrete collar, lock in place, etc.) on the field data record.
- Check that the water level tape has no obvious kinks or damage. If multiple water level meters are to be used, they should be checked for consistency by comparing readings from all meters used at one easily accessible monitoring well.
- Don appropriate PPE for the task and site conditions. Stand upwind of the well; unlock and open the well. If a vented cap is present, conduct well mouth air screening from the vent. If a non-vented well cap is present, remove the cap and screen the well mouth immediately. Record all

pertinent air monitoring results (sustained, dissipating, background, odor) on the field data record and in the field logbook.

- Identify the previous measuring point marking or notch on the riser or casing (if present). Record this location in the field logbook and on the field data record. It is important to always include the measuring point reference with the water level measurement (*e.g.* 7.15 feet below top of PVC riser [TOR]).
- Using a previously decontaminated water level indicator, turn on the meter, check the audible indicator, reel the electronic probe into the well riser (with the increments visible) slowly until the meter sounds, grasp the tape with hand, withdraw the tape and lower it again slowly until the sound is again audible. Check the depth to water on the tape and make a mental note of the depth to within 0.01 feet. Lower the probe again slowly and repeat the measurement for accuracy. If the measurement varies, repeat until a consistent measurement has been determined. It is not uncommon for a well to be under vacuum/pressure and for water in the well to rise or drop after the cap has been opened until the water reaches equilibrium with atmospheric pressure. A one-foot error is the most common measurement type during water level measurements. Be sure to read the depth correctly on the tape.
- Record the depth to water from the measuring point on the field data record. Make sure to include the measuring point reference with the water level measurement.
- Procedures utilized during water level measurements where free phase petroleum products are floating on the water table should be modified to include the use of the oil/water interface probe. The procedures during the use of this probe should be implemented similarly and by manufacturers' specifications. Using this type of probe, the thickness of the product can be determined.
- When measuring the depth to the bottom of the well, care must be taken to accurately determine the true depth to bottom as the graduated tape on a water level indicator will vary with manufacturer. At the start of the field program, using an engineer's rule, measure from the 1-ft graduated mark on the tape to the 0-ft setpoint on the probe. For some manufactures (*e.g.* Heron Instruments) the 0-ft setpoint is the bottom of the probe and depth to bottom measurements can be directly recorded from the graduated tape. Pin style water level indicators (*e.g.* Solinst) typically have a 0-ft setpoint that is halfway up the metallic probe. For these style probes the offset from the bottom of the probe to the point of the pin must be measured and then added to depth to bottom measurements from the graduated tape.

Decontaminate the probe and tape. Refer to the **Field Equipment Decontamination** for guidance.

3.0 ATTACHMENTS

Water Level Measurement and Monitoring Well Condition Field Data Record

Water Level Monitoring Field Data Record

Site Name/Location:

Inspection Date/Initials:

Reviewed By/Date:

Location ID	Measuring Point Elevation (ft. above msl)	Measurement Reference Point Marked (Y/N)	Protective Casing Stickup (ft.)	TOC-TOR Difference (ft.)	Depth to Water (ft.)	Depth to BOW (ft.)	Well ID Clearly Labeled (Y/N)	Guard Posts (G/F/P)	Well Lock/Cap (G/F/P)	Protective Casing (G/F/P)	Water in Annular Space (Y/N)	Concrete Pad (G/F/P)	Well Riser/Cap (G/F/P)	Well Obstruction (Y/N)	Comments
Notes: MW= Monitoring Well msl = mean sea level ft. = feet TOC = top of casing TOR = top of riser F = Fair G = Good N = No P = Poor Y = yes Poor or notable observations require input into "Comments" in. = inches BOW = bottom of well															

SOP # S3

EEEG STANDARD OPERATING PROCEDURE #S3

LOW FLOW GROUNDWATER SAMPLING PROCEDURES

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Nathan Vogan, PG, Project Technical Lead

August 31, 2025

Date

Reviewed

Date

LOW FLOW GROUNDWATER SAMPLING

1.0 PURPOSE

The following steps outline the purging and sample collection activities for low-flow sampling. Data will be recorded on the Low Flow Groundwater Field Data Record. Construction of monitoring wells may vary; therefore, this SOP may not be applicable to all situations.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure should be documented in the field logbook and/or field data record.

2.0 REFERENCES

U.S. Environmental Protection Agency (EPA), 2017. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from monitoring Wells (Revision 4). EQASOP-GW4. Effective date July 30, 1996, Revised September 19, 2017.

3.0 PROCEDURE

This section contains both the responsibilities and procedures involved with sampling environmental monitoring wells. Proper procedures are necessary to ensure the quality and integrity of the samples.

3.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures based on the sampling objectives.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations is also responsible for implementation of corrective action (e.g., retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations and documenting the deviation in the field logbook.

3.2 Preparation

Office Preparation

- Review pertinent information with regards to well construction, development, and sampling information on the wells to be tested, if available.
- Determine target depth for location of the pump intake. Target depth should be the portion of the screened interval that intersects the zone of highest K. If the zone of highest K is unknown, or if the screen is placed within homogenous material, then the target depth shall be the midpoint of the saturated screen length. Primary flow zones should be identified in wells with screen lengths longer than 10 ft.
- Assemble appropriate logbooks and field data records to complete the field assignment.
- Make copies of field data records from the last sampling event.

Equipment Selection

Sampling pumps and water quality probes may vary depending on the well diameter, groundwater constituents and depth to groundwater, but generally, sampling will consist of the following equipment:

- Pump (e.g., peristaltic, bladder, submersible, or inertial) capable of a flow rate between 50 and 500 ml/minute and appropriate power supply. The pump type will principally depend on the depth to water and well diameter. Peristaltic pumps are effective only for wells where the depth to water is less than about 25 ft. Bladder pumps and submersible pumps are most commonly used for wells with depths to water greater than 25 ft. Inertial pumps are only recommended for narrow diameter wells that cannot be sampled using a bladder or peristaltic pump.
- Water quality parameter probes and flow-through cell (e.g., YSI) for measuring pH, temperature, conductivity (and/or specific conductance), dissolved oxygen (DO) and oxidation/reduction potential (ORP) of groundwater.
- Turbidity meter (e.g. Hach)
- Calibration solutions for the water quality parameter probes
- Graduated water level indicator (accurate to 0.01 ft)
- Tubing, connections and tools as appropriate
- Graduated measurement container
- Watch or stopwatch
- Purge water container (e.g. 5-gallon bucket or carboy)
- Low flow groundwater sampling record (**example Attached**)
- Personal protection equipment (PPE)
- Decontamination supplies (e.g., DI water, Liquinox® soap, paper towels)

- Sample containers and cooler (provided by the laboratory)
- Ice for sample preservation
- Clean plastic sheeting
- Paper towels.

3.3 Field Procedures

Water quality parameter measurements shall be made using instrumentation and a flow through cell. Water quality parameter instruments will be calibrated daily as per the manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**example attached**).

Sampling will be conducted using the following procedure:

1. Don appropriate PPE.
2. If a submersible pump is used, decontaminate pump prior to use (if pumps are dedicated then this applies to the initial effort only) (**Equipment Decontamination SOP Table A-1**). Attach appropriate length of dedicated tubing or mark the tubing at the appropriate point so that when the pump and tubing are lowered into the well, and the mark is at the top of the well riser, the pump will be located at the target depth within the screened interval per the field activities plan.
3. Measure and record the depth to water and depth to the bottom of the well. Preferably, bottom of well measurements should be collected during synoptic water level rounds completed at the start of each sampling program. Care should be taken to minimize disturbance of the water column within the well during pre-sample measurements.
4. Carefully lower the pump to the predetermined target depth. Do not connect the discharge tubing to the flow through cell and instead secure it to the discharge container.
5. Refer to the previous field data record or well development form to determine an initial flow rate. If sampling the well for the first time, determining an appropriate flow rate is the primary objective at the start of purging. The following steps and considerations shall be followed for pumping rate determination:
 - a. Some drawdown in the well is expected and preferred as it demonstrates that the well is being adequately stressed and water that is purged is representative of the aquifer.
 - b. Start the pump at the lowest possible setting and start monitoring the water level in the well. Slowly increase the pump speed until drawdown of the water column is observed.
 - c. Once drawdown of the water column is observed, carefully monitor the rate in which it is dropping. Adjust pump speed until there is little (i.e., less than 0.3 ft) or no drawdown in the

well over a 5-minute interval. The objective of the flow determination is to maintain the highest flow possible while minimizing drawdown. If stabilized drawdown cannot be achieved at the lowest possible pumping rate, use the no-purge method described later in step 11 of this section.

6. Once the flow rate has been determined and the purge water is mostly clear, the discharge tubing can be attached to the flow through cell for parameter collection.
7. Monitor and record pumping rate and water levels every 3 to 5 minutes (or as appropriate) during purging. Appropriate measurement frequency may be calculated using the flow rate and the time required to purge a volume equivalent to that in the sample tubing and flow through cell. Record any adjustments to pumping rates on the field data record.
8. During purging and sampling the tubing should remain filled with water.
9. If there is visible turbidity in the discharge water, continue purging until the turbidity clears up, if possible, before connecting to the flow through cell. Connect the discharge tubing to the flow through cell. The flow through cell cannot be used for turbidity measurements. Turbidity should be measured prior to entering the flow through cell through the use of an inline tee fitting. Purging is considered complete and sampling may begin when the field parameters have stabilized, or the purge time has exceeded 2 hours. Stabilization is considered to be achieved when three consecutive readings, taken at 3 to 5-minute intervals, are within the following limits:
 1. Turbidity (+/- 10% for values >10 NTUs. If turbidity is greater than 10 and does not stabilize, continue purging well for up to two hours, collect sample and document on the FDR and in field logbook. Collection of a filtered sample for metals analysis may be necessary if turbidity is greater than 50 NTUs.)
 2. DO (+/- 10% for values greater than 0.5 milligram per liter (mg/L). If three dissolved oxygen values are < 0.5 mg/L, then DO is considered stabilized)
 3. Specific conductivity (+/- 3%)
 4. Temperature (+/- 3°)
 5. pH ($\pm$ 0.1 unit)
 6. ORP ($\pm$ 10 millivolts)
10. To ensure the sample is representative of formation water, the final purge volume must be greater than the volume of the well drawdown (calculated by multiplying the height of the drop in water level by the radius of the well casing squared times pi) plus the volume of the sample tubing.

11. If there is excessive drawdown in the well such that water levels do not stabilize while pumping, the well can be sampled using the no-purge method. For this method, the well is purged until dry and the well allowed to recharge as much as possible. The sample is then collected from the recharged water.
12. To collect the analytical sample, disconnect the tubing from the flow through cell. Water samples for laboratory analyses must not be collected after water has passed through the flow through assembly. Fill sample containers directly from the tubing without alterations to the pumping rate (pumping rate may be lowered for the collection of VOC samples to avoid splashing or overfilling).
13. The volatile organic compound (VOC) fraction shall be collected first. The VOC sample container shall be filled without air space within the container. The VOC container should not be overfilled to avoid diluting the sample preservative. The vial should be 90% filled, and then topped off using water added incrementally from the container cap.
 1. Samples will be labelled and handled consistent with the procedures in the QAPP and **Chain of Custody SOP (Table A-1)**.
14. Subsequent sampling efforts should duplicate the pump intake depth and final purge rate from the initial sampling event (use final pump dial setting information).
15. If using non-dedicated equipment, remove the pump from the well and decontaminate by flushing with the decontamination fluid specified in the **Equipment Decontamination SOP (Table A-1)**, or the site-specific FAP. Typically, decontamination will consist of flushing the pump with potable water and Alconox® followed by flushing with deionized water.
16. Complete remaining calculation and entries on the Low flow Groundwater field data record after sampling is completed at each well. Include any observations made during sampling such as color, odor, etc., in the field logbook and field data record.
17. Secure the well cap, compression plug, and lock.

4.0 ATTACHMENTS

Low Flow Groundwater Sampling Record

Field Instrument Calibration Record

Information Handout: Low Flow Groundwater Field Parameter Data

LOW FLOW GROUNDWATER SAMPLING RECORD



Two Monument Square
Suite 200
Portland, Maine 04101

PROJECT NAME	
PROJECT NUMBER	
SAMPLE ID	SAMPLE TIME

LOCATION ID	DATE
START TIME	END TIME
SITE NAME/INSTALLATION	PAGE OF

WELL DIAMETER (IN.)	☐ 1	☐ 2	☐ 4	☐ 6	☐ 8	☐ OTHER _____
TUBING ID (INCHES)	☐ 1/8	☐ 1/4	☐ 3/8	☐ 1/2	☐ 5/8	☐ OTHER _____
MEASUREMENT POINT (MP)	☐ TOP OF RISER (TOR)	☐ TOP OF CASING (TOC)	☐ OTHER _____			

WELL INTEGRITY		
YES	NO	N/A
CAP	___	___
CASING	___	___
LOCKED	___	___
COLLAR	___	___

INITIAL DTW (BMP)	FT	FINAL DTW (BMP)	FT	PROT. CASING STICKUP (AGS)	FT	TOC/TOR DIFFERENCE	FT
WELL DEPTH (BMP)	FT	SCREEN INTERVAL	FT	PID AMBIENT AIR	NA PPM	REFILL TIMER SETTING	NA SEC
WATER COLUMN	FT	DRAWDOWN VOLUME (final DTW- initial DTW X well diam. squared X 0.041)	GAL	PID WELL MOUTH	NA PPM	DISCHARGE TIMER SETTING	NA SEC
CALCULATED GAL/VOL (water column X well diameter ² X 0.041)	GAL	TOTAL VOL. PURGED (mL per minute X total minutes X 0.00026 gal/mL)	GAL	DRAWDOWN/ TOTAL PURGED		PRESSURE TO PUMP	NA PSI

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA

TIME	DTW (FT)	PURGE RATE (mL/min)	TEMP. (°C) ±3%	SP. CONDUCTANCE (mS/cm) ±3%	DISS. O ₂ (mg/L) ±10% or 3 values <0.5 mg/L	pH (units) ±0.1	REDOX (mv) ±10 mv	TURBIDITY (ntu) ±10% or <10 ntu	PUMP INTAKE DEPTH (ft)	COMMENTS
	BEGIN PURGING									

FINAL STABILIZED FIELD PARAMETERS (rounded to appropriate significant figures)								TEMP.: nearest degree (ex. 10.1 = 10) COND.: 3 significant figure max (ex. 1.686 = 1.69) pH: nearest tenth (ex. 5.53 = 5.5) DO: nearest tenth (ex. 3.51 = 3.5) TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101) ORP: 2 SF (44.1 = 44, 191 = 190)		

EQUIPMENT DOCUMENTATION

<u>TYPE OF PUMP</u>		<u>DECON FLUIDS USED</u>		<u>TUBING/PUMP/BLADDER MATERIALS</u>		<u>EQUIPMENT USED</u>	
☐ PERISTALTIC		☐ ALCONOX		☐ SILICON TUBING	☐ S. STEEL PUMP MATERIAL	☐ WL METER	_____
☐ SUBMERSIBLE		☐ DEIONIZED WATER		☐ HDPE TUBING	☐ PVC PUMP MATERIAL	☐ PID	_____
☐ BLADDER	_____	☐ POTABLE WATER		☐ LDPE TUBING	☐ GEOPROBE SCREEN	☐ WQ METER	_____
☐ WATTERA	_____	☐ NITRIC ACID		☐ OTHER	☐ OTHER	☐ TURB. METER	_____
☐ OTHER	_____	☐ HEXANE		☐ OTHER	☐ OTHER	☐ PUMP	_____
☐ OTHER	_____	☐ METHANOL		☐ OTHER	☐ OTHER	☐ OTHER	_____
		☐ OTHER	_____			☐ FILTERS	NO. ____ TYPE _____

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	ANALYTE LIST	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	QC COLLECTED
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____

PURGE OBSERVATIONS		NUMBER OF GALLONS GENERATED _____
PURGE WATER CONTAINERIZED	YES ☐ NO ☐	
NO-PURGE METHOD UTILIZED	YES ☐ NO ☐	

NOTES

Sampler Signature: _____	Print Name: _____
Checked By: _____	Date: _____

DEVIATIONS FROM THE WORK PLAN

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT LOCATION: _____

WEATHER CONDITIONS (AM): _____

WEATHER CONDITIONS (PM): _____

TASK NO: _____

DATE: _____

MACTEC CREW: _____

SAMPLER NAME: _____

SAMPLER SIGNATURE: _____

CHECKED BY: _____

DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

AM CALIBRATION

Start Time _____/End Time _____

Units

Standard Value

Meter Value

*Acceptance Criteria (AM)

pH (4)

SU

4.0

+/- 0.1 pH Units

pH (7)

SU

7.0

+/- 0.1 pH Units

pH (10)

SU

10.0

+/- 0.1 pH Units

Redox

+/- mV

240

+/- 10 mV

Conductivity

mS/cm

1.413

+/- 0.5 % of standard

DO (saturated)

%

100

+/- 2% of standard

DO (saturated)

mg/L¹ (see Chart 1)

+/- 0.2 mg/L

DO (<0.1)

mg/L

<0.1

< 0.5 mg/L

Temperature

°C

Baro. Press.

mmHg

POST CALIBRATION CHECK

Start Time _____/End Time _____

Standard Value

Meter Value

*Acceptance Criteria (PM)

7.0

+/- 0.3 pH Units

240

+/- 10 mV

1.413

+/- 5% of standard

+/- 0.5 mg/L of standard

TURBIDITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Units

Standard Value

Meter Value

<0.1 Standard

NTU

<0.1

20 Standard

NTU

20

100 Standard

NTU

100

800 Standard

NTU

800

Standard Value

Meter Value

*Acceptance Criteria (PM)

<0.1

+/- 0.3 NTU of stan.

20

+/- 5% of standard

100

+/- 5% of standard

800

+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Background

ppmv

<0.1

Span Gas

ppmv

100

<0.1

within 5 ppmv of BG

100

+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Methane

%

50

O₂

%

20.9

H₂S

ppmv

25

CO

ppmv

50

50

+/- 10% of standard

20.9

+/- 10% of standard

25

+/- 10% of standard

50

+/- 10% of standard

OTHER METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

See Notes Below

for Additional

Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☐ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: _____

Lot#/Date Produced: _____

Trip Blank Source: _____

Sample Preservatives Source: _____

Disposable Filter Type: _____

Calibration Fluids / Standard Source:

- DO Calibration Fluid (<0.1 mg/L)

- Other

- Other

- Other

Portland FOS

Laboratory provided

Laboratory provided

in-line 0.45µm cellulose

Portland FOS

Cal. Standard Lot Number

Exp. Date

pH (4)

pH (7)

pH (10)

ORP

Conductivity

<0.1 Turb. Stan.

20 Turb. Stan.

100 Turb. Stan.

800 Turb. Stan.

PID Span Gas

O₂-LEL Span Gas

Other

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

EARTH ENVIRONMENT

Engineering and Geology P.C.

Two Monument Square, Suite 200, Portland Maine 04101

FIELD INSTRUMENT CALIBRATION RECORD

NYSDEC Field Programs
Information Handout: Low Flow Groundwater Field Parameter Data
March 2017, Revised April 2020

INTRODUCTION

This sheet provides information related to field data collection during low flow groundwater sampling including: temperature, pH, turbidity, conductivity, dissolved oxygen (DO), and oxidation/reduction potential (ORP). The goal of this handout is to provide a general understanding of the data being collected to assist staff with identify situations where data may not be accurate due to improper instrument calibration or instrument error.

Documents containing additional information are provided as attachments including:

- USEPA Region 1 Standard Operating Procedure Calibration of Field Instruments (Attachment 1)
- USEPA Region 1 Low Stress (Low Flow) Purging And Sampling Procedure For The Collection Of Groundwater Samples From Monitoring Wells (Attachment 2)
- instrument information pamphlets provided by Pine Environmental (Attachment 3), and
- a link to the USGS National Field Manual website.

GENERAL CONSIDERATIONS FOR FIELD EVENTS

- Review NYSDEC Program QAPP SOPs and Project Field Activities Plan (FAP)
- Record field data on appropriate Field Data Record (FDR)
- Avoid storing equipment/instruments for long periods in extreme cold or hot conditions that might occurred in parked car in the field
- Calibrate instruments in controlled environment (room temp if possible).
- Do not get turbidity meters wet. All other equipment is typically more water resistant but is not waterproof. Care should be taken to protect all equipment during rain events.
- Record field parameter results as displayed on the instrument. Significant figures and rounding will be applied later during data summary process.
- For questions regarding equipment contact the Field Operations Lead or Bruce Cunningham 207 828-3657 if equipment is obtained from Field Operations Support group in Portland (FOS).

LOW FLOW GROUNDWATER FIELD DATA

Instruments used for low flow groundwater sampling that are currently provided by the FOS group in Portland, Maine include:

- YSI 556 Multiparameter System
- HACH 2100P Turbidimeter or HACH 2100Q
- Water level indicator

Instructions on instrument calibration, maintenance and operation which are provided by Pine Environmental Services are included in Attachment 3.

Temperature

Units: Temperature should be measured in degrees Celsius (°C).

Calibration – Thermometers are not calibrated by field staff, they are checked against a NIST Thermometer annually. Record of annual calibration filed in Portland FOS with Bruce Cunningham. If the instrument readings are questionable it can be checked with ice water which should be register approximately 0 °C

Other considerations: Some field parameters are corrected based on temperature (pH, dissolved oxygen, and specific conductance). So it is important that the temperature is correct.

Typical measurements: Average groundwater temperatures in the Northeast range from approximately 5.5 °C in Maine to 11 °C in southern New York. Seasonal temperatures vary by as much as ± 10 °C in shallow wells and less in deeper wells.

pH

Units: pH is measured in pH standard units (SU) on a scale of 0-14. The pH (power of hydrogen) scale measures the concentration of hydrogen ions in solution.

Calibration – pH will be calibrated prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is complete. pH will be calibrated with 2 or 3 solutions (based on project requirements) covering the expected range. Typically pH 4 and pH 7 (and pH 10 if a third solution is required) will be used. Acceptance criteria is ± 0.1 for the AM check and ± 0.3 at pH 7 for the PM check. Rinse and dry the probe between solution checks.

Maintenance and Corrective Actions: pH is measured through the glass bulb located on the end of the probe. Do not touch the glass bulb with fingers. Oily film or scratches on the bulb will interfere with the design characteristics of the glass membrane and affect pH measurements. Do not use the instrument if the bulb is broken or scratched or if the electrode body is cracked, broken or the internal electrode has been damaged. If necessary, the probe can be replaced either through FOS or the rental company.

Typical measurements: Most groundwater in the US has pH ranging from 6 to 8.5 SU and surface water ranges from 6.5 to 8.5 SU. The pH of distilled water is usually around 5.6 SU due to dissolved CO₂ and the formation of carbonic acid.

Oxidation/Reduction Potential (ORP)

Units: ORP (also referred to as redox potential [Eh]) is a measure of the intensity of electron activity between two electrodes. ORP is measured in millivolts (mV).

Calibration: ORP will be calibrated prior to mobilization to the field and daily prior to conducting field activities. The instrument should be allowed to stabilize before running daily calibrations and should be adjusted for temperature according to the manufactures specifications. Our typical calibration solution has a value of 240 mV with an acceptance criteria of ± 10 mV.

Maintenance and Corrective Actions: If calibration readings are not within acceptance criteria the electrodes may need to be cleaned. Cleaning instructions are provided in the YSI technical notes or contact Bruce Cunningham for assistance. Alternatively new calibration solutions may be needed.

Typical measurements: ORP will vary from site to site and within sites depending on a variety of factors including dissolved chemicals (metals and other compounds), and pH. In general, positive values indicate an oxidizing environment and negative values indicate a reducing environment.

Redox conditions can affect the presence of dissolved chemicals in water. Iron (ferrous iron) and dissolved manganese are often present in reducing conditions and hexavalent chromium (Cr₆) might be found in oxidizing conditions.

Specific Conductance (conductivity)

Units: Conductivity is measured in Siemens (S) and distance. Field data records typically use millisiemens per centimeter (mS/cm), but instruments may provide data in other converted forms ($10^6 \mu\text{S/cm} = 10^3 \text{ mS/cm} = 1 \text{ S/cm}$). mho may also be used as a unit of measure for conductivity; this is numerically the same S.

Calibration: Conductivity will be calibrated prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is completed. Daily calibration is a check against a standard of known concentration. Acceptance criteria for conductivity is $\pm 0.5\%$ for the AM check and $\pm 5\%$ for the post sampling check.

Maintenance and Corrective Actions: If calibration readings are not within the acceptance criteria, the electrodes may need to be cleaned. Contact Bruce Cunningham if equipment was obtained from FOS and he will provide instructions as appropriate.

Because the actual conductivity of a solution changes with temperature, conductivity measurements are automatically normalized to 25°C by the field instrument.

Typical measurements:

Distilled Water: 0.0005 mS/cm

Deionized water: 0.00001 – 0.001 mS/cm

Tap Water: 0.5 – 0.8 mS/cm

Drinking water: 0.05 – 0.5 mS/cm

Groundwater: 0.05 – 50 mS/cm

Surface Water: 0.01 – 4 mS/cm

Sea water: 50 mS/cm

Dissolved Oxygen

Units: Instrumentation will report DO values as either percent saturation or ppm (mg/L) units. Field data should be reported in mg/L.

Calibration: DO instrument calibration check will be conducted prior to mobilization to the field and daily once prior to conducting field activities and once after sampling is complete. Calibration checks are conducted using an oxygen saturated solution and DO free solution (if require for the field program).

Calibration for DO must be adjusted based on air pressure (mmHg) and temp (°C). Use Pressure and Temperature Chart to determine saturated solution concentration (Attachment 4). Air pressure readings can be obtained from <http://weather.noaa.gov/>. Barometric pressure is often in inches Hg which can be converted to mm by multiplying inches by 25.4.

Acceptance criteria:

DO saturation solution $\pm 2\%$ (0.2 mg/L) AM calibration and $\pm 5\%$ (0.5 mg/L) PM calibration.

Zero solution: $< 5\%$ (0.5 mg/L) both AM and PM.

Maintenance and Corrective Actions: The DO sensor should not be allowed to dry out and should be kept moist during storage. Method performance can be negatively affected by the following:

- calibration drift
- a loose, wrinkled, or damaged membrane
- air bubbles in the electrolyte solution
- loose-fitting O-rings and membranes
- damaged, dirty, or otherwise contaminated electrodes under the membrane.

If there is a problem with the membrane, follow instructions that are included with the instrument on how to repair or replace the membrane or contact Bruce Cunningham at FOS with questions.

Typical measurements: Groundwater DO can range from near saturation (approximately 14 mg/L) in locations where the water table is near the ground surface to <2 mg/L. Although low DO could be the result of many factors, it may indicate reducing groundwater conditions due to:

- proximity to wetlands
- landfills
- VOC plumes

Turbidity

Units: Turbidity is a measure of how light is scattered or absorbed and is measured in NTU (Nephelometric Turbidity Units).

Calibration: Initial instrument calibration is completed by the manufacturer or FOS. Check standards should be run daily prior to use in the field with commercial reference standards. Acceptance criteria is $\pm 5\%$. Check standard vials should be cleaned prior to use.

Maintenance and Corrective Actions: Dirty or scratched vials/cell or air bubbles can give false results. It is important to make sure the sample vial is clean. If there are visible scratches replace the sample vial.

Typical measurements: Clean drinking water has turbidity <5 NTU. Turbidity <50 NTU may not be visually noticeable.

Additional Information:

Additional documents that provide useful include:

- USEPA Region 1 Standard Operating Procedure Calibration of Field Instruments; Quality Assurance Unit, USEPA Region I, 11 Technology Drive, North Chelmsford, MA 01863. Jan 2010.
- USEPA Region 1 Low Stress (Low Flow) Purging And Sampling Procedure For The Collection Of Groundwater Samples From Monitoring Wells (Revision 4). EQASOP-GW4. Effective date July 30, 1996, Revised September 19, 2017.
- Various information provided by instrument manufacturers
<http://www.fielDENvironmental.com/assets/files/Manuals/YSI%20556%20MPS%20Manual.pdf>; <https://www.ysi.com/parameters/dissolved-oxygen?Dissolved-Oxygen-1>
- USGS National Field Manual for the Collection of Water-Quality Data,
<http://water.usgs.gov/owq/FieldManual/>

SOP # S6

EEEG STANDARD OPERATING PROCEDURE #S6

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) FIELD SAMPLING PROTOCOLS

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 31, 2025

Date

Reviewed

Date

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) FIELD SAMPLING PROTOCOLS

1.0 PURPOSE

The purpose of this SOP is to describe the procedures/considerations when collecting soil, sediment, surface water, and groundwater samples for per- and polyfluoroalkyl substances (PFAS) characterization at a site. This SOP also describes a tiered approach that should be used to assist with field decisions. Sampling specific SOPs should also be reviewed prior to conducting field sampling activities for PFAS characterization.

This procedure applies to all EEEG personnel and subcontractors who collect or otherwise handle samples of soil, sediment, surface water, and groundwater for analysis of PFAS. This SOP should be reviewed by all on-site personnel prior to implementation of field activities.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field log book and field forms.

Procedures and protocols in this SOP and the Program QAPP have been designed to comply with NYSDEC PFAS Sampling Guidelines (NYSDEC, 2022) (**Attached**).

2.0 REFERENCES

NYSDEC, 2023. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs; New York State Department of Environmental Conservation. April 2023.

3.0 PROCEDURES

Given the low detection limits associated with laboratory PFAS analysis, and the many potential sources of trace levels of PFAS, field personnel are advised to act on the side of caution by strictly following the subject protocols, frequently replacing nitrile gloves, and rinsing field equipment to help mitigate the potential for false detections of PFAS.

This section contains both the responsibilities and procedures involved with field sampling for analysis of PFAS.

3.1 Responsibilities

Project Manager

The project manager (PM) shall provide the Quality Assurance Program Plan (QAPP) and site-specific field activities plan (FAP) to project personnel, which shall include the sampling requirements for each investigation. The PM will detail deviations to the procedure provided in this SOP in the site-specific FAP.

Field Operations Lead

The field operations lead shall ensure that samples are collected using procedures that are in accordance with the QAPP, site-specific FAPs, and applicable SOPs. The field operations lead shall also be required to make rational and justifiable decisions when deviations from these procedures are necessary because of field conditions or unforeseen issues and report the deviations to the PM.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing their tasks according to specifications outlined in the QAPP, site-specific FAPs, applicable SOPs, and other appropriate procedures. Field personnel are responsible for reporting deviations from procedures to the field operations lead and PM and documented in the field logbook and field data record.

3.2 Field Procedures/Considerations

The following are procedures/considerations to be made during field activities for PFAS sampling. A summary of the prohibited and acceptable items for PFAS investigation areas is included in Table 1. A checklist (**Attached**) shall be used daily prior to the commencement of fieldwork to ensure the field team is in compliance with this protocol.

Field Equipment

- **Do not use Teflon®-containing materials** (e.g., Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) since Teflon® contains fluorinated compounds.
- Sample containers and collected samples will be stored and shipped using dedicated coolers provided by the laboratory.
- Stainless steel, high-density polyethylene, polypropylene, and silicone materials are acceptable for sampling. Samples should not be collected with tubing or stored in containers made of low-density polyethylene materials (fluorinated compounds are known to adsorb to low-density polyethylene materials). All sampling equipment components and sample containers should not come in contact with aluminum foil, low-density polyethylene materials, glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.
- EEEG will use peristaltic pumps for groundwater sample collection at depths shallower than 25 feet. EEEG will use ProActive SS Pumps with polyvinyl chloride leads or Geotech SS Geosub pumps for groundwater sample collection at depths greater than 25 feet. These pumps are constructed with stainless steel and will minimize introductions of PFAS. PFAS-free bladder pumps may also be used for sampling. polyvinyl chloride (e.g. Whale®) pumps can be used for well development, if needed, but should not be used for sampling, or left in the wells.
- When using liners to collect soil samples during direct-push technology or during conventional drilling and sampling methodologies, acetate liners are to be used.
- Field reports will be documented on loose paper secured on masonite or aluminum clipboards (i.e. plastic clipboards, binders, or spiral hard cover notebooks are not acceptable) using a pen or pencil.
- **Post-It Notes are not allowed** on project sites.

- Use ballpoint pens. Pens will be used when documenting field activities in the field log and on field forms as well as labeling sample containers and preparing the Chain of Custody.
- **Do not use chemical (blue) ice packs** during the sampling program. This includes the use of ice packs for the storage of food and/or samples.

Field Clothing and Personal Protective Equipment

- **Do not wear water resistant, waterproof, or stain-treated clothing** during the field program. Field clothing made of synthetic and natural fibers (preferably cotton) are acceptable. Field clothing should be laundered without the use of fabric softener. Preferably, field gear should be cotton construction and well laundered (i.e., washed a minimum of three times prior to use after purchase). New clothing may contain PFAS related treatments. **Do not use new clothing** while sampling or sample handling.
- **Do not wear clothing or boots containing Gore-Tex™** during the sampling program as it contains a PFAS membrane.
- Safety footwear will consist of steel-toed boots made with polyurethane and polyvinyl chloride, untreated leather boots, or well-worn leather boots. Newer leather boots may be worn if they are covered with polypropylene, polyethane, or polyvinyl chloride boot covers.
- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves shall be donned prior to the following activities at each sample location:
 - Decontamination of re-usable sampling equipment.
 - Handling sample bottles or water containers.
 - Insertion of anything into the well (e.g., high-density polyethylene tubing, HydraSleeve™, bailer, etc.).
 - Insertion of silicone tubing into the peristaltic pump.
 - Sample Collection after completion of monitor well purging; and,
 - Handling of any quality assurance/quality control samples including field blanks and equipment blanks.

In addition, gloves should be changed after the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

Sample Containers

- Different laboratories may supply sample collection containers of varying sizes dependent on the type of media to be sampled (e.g., soil, groundwater, etc.). All samples should be collected in polypropylene or high-density polyethylene bottles. The screw cap will be made of polypropylene or high-density polyethylene and may be lined or unlined. However, if lined, the liner may not be made of Teflon® or other material containing PFAS.
- Container labels will be completed using pen after the caps have been placed back on each bottle.
- Glass sample containers are not to be used due to potential loss of analyte through adsorption.

Wet Weather

- Field sampling occurring during wet weather (e.g., rainfall and snowfall) should be conducted while wearing appropriate clothing that will not pose a risk for cross-contamination. Teams will avoid synthetic gear that has been treated with water-repellant finishes containing PFAS. Use rain gear made from polyurethane, vinyl, and wax or rubber-coated materials.
- Teams should consider the use of a gazebo tent, which can be erected overtop of the sample location and provide shelter from the rain. It should be noted that the canopy material is likely a treated surface and should be handled as such; therefore, gloves should be worn when setting up and moving the tent, changed immediately afterwards and further contact with the tent should be avoided until all sampling activities have been finished and the team is ready to move on to the next sample location.

Equipment Decontamination

- Field sampling equipment used at each sample location, will require cleaning between uses. Alconox® and Liquinox® soap is acceptable for use since the Safety Data Sheets do not list fluoro-surfactants as an ingredient (do not use Liquinox® soap if also sampling for 1,4-dioxane). However, Decon 90 will not be used during decontamination activities. Water used for the final rinse during decontamination of sampling equipment will be laboratory certified “PFAS-free” water.
- For larger equipment (e.g., drill rig and large downhole drilling and sampling equipment), decontamination will be conducted with potable water using a high-pressure washer and then rinsed using potable water.

Groundwater Sampling

- At sites with dedicated sampling equipment installed in the wells that contains Teflon (e.g., tubing, pumps), this equipment should be removed from the wells and replaced with high-density polyethylene tubing and non-Teflon containing equipment, if possible. These wells will be re-developed by removing three well volumes of water, if possible, and letting the wells recover for at least 48 hours prior to sampling.
- At sites with dedicated sampling equipment installed in the wells that contain low-density polyethylene tubing, this tubing should be removed from the wells and replaced with high-density polyethylene tubing. These wells can be sampled immediately following replacement of tubing; however, attempts should be made to remove one well volume prior to sampling. For larger wells, with higher volumes of water, it may be preferable to redevelop the wells and remove one well volume with a higher volume pump. In such cases the wells should be allowed to recover for at least 48 hours prior to sampling.

Personnel Hygiene

- Field personnel will not use cosmetics, moisturizers, hand cream, or other related products as part of their personal cleaning/showering routine on the morning of a sampling event, unless the

products are applied to a part of the body that will be covered by clothing. These products may contain surfactants and represent a potential source of PFAS.

- All clothing worn by sampling personnel must have been laundered multiple times.
- Many manufactured sunblock and insect repellants contain PFAS and should not be brought or used on-site. Sunblock and insect repellants that are used on-site should consist of 100% natural ingredients, unless previously vetted by the project chemist. A list of acceptable sunscreens and insect repellents is provided in Table 1.
- For washroom breaks, field personnel will leave the exclusion zone and then remove gloves and overalls. Field personnel should wash as normal with extra time for rinsing with water after soap use. When finished washing, the use of a mechanical dryer is preferred and the use of paper towel for drying is to be avoided (if possible).

Food Considerations

- No food or drink shall be brought on-site, with the exception of bottled water and hydration drinks (e.g., Gatorade® and Powerade®), which will only be allowed to be brought and consumed within the staging area.

Visitors

- Visitors to the investigation area are asked to remain outside of the exclusion zone during sampling activities.

4.0 TIERED APPROACH TO ASSIST WITH FIELD DECISIONS

In evaluating whether products contain PFAS and are suitable for use in the field, the tiered approach presented in Table 2 will be used to assist with field decisions. Any member of the field team should contact the project manager with questions.

Table 1. Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited Items	Acceptable Items
Field Equipment	
Teflon® containing materials	High-density polyethylene materials
Storage of samples in containers made of LDPE materials	Acetate liners, high-density polyethylene bottles
Teflon® tubing	high-density polyethylene or silicone tubing
Waterproof field books not manufactured by Rite in the Rain	Rite in the Rain products or Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Sharpies®, if possible	Ballpoint pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gasoids NT Non-PTFE Thread Sealant Bentonite

Equipment with Viton Components (need to be evaluated on a case by case basis, Viton contains PTFE, but may be acceptable if used in gaskets or O-rings that are sealed away and will not come into contact with sample or sampling equipment.)	
Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed three or more times after purchase, made of synthetic or natural fibers (preferable cotton)
Clothing laundered using fabric softener	
Boots containing Gore-Tex™	Boots made with polyurethane and PVC, well-worn or untreated leather boots, leather boots with boot covers
	Reflective safety vests, Tyvek®, Cotton Clothing, synthetic under clothing, body braces
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling, unless the products are applied to body parts that will be covered by clothing.	Sunscreens - Alba Organics Natural Sunscreen, Yes to Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural” Insect Repellents - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellent, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, Deep Woods Off Sunscreen and insect repellent - Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
low-density polyethylene or glass containers	high-density polyethylene or polypropylene
Teflon®-lined caps	Lined or unlined high-density polyethylene or polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Polyurethane, vinyl, wax or rubber-coated rain gear. Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90	Alconox® and/or Liquinox® (Do not use Liquinox® if also sampling for 1,4-dioxane).
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on the right	Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area

Table 2. Tiered Approach

Tier and Description	Action
Tier 1: Products that <i>will come into direct contact</i> with field samples include, but are not limited to, drilling grease, sampling equipment, sample containers, and well	These products will undergo the greatest scrutiny and requires chemist’s input to help evaluate the materials as a possible source of contamination ^A and as possible sampling and/or storage materials

construction materials	
Tier 2: Products that <i>will not come into direct contact</i> with samples, but could be <i>reasonably expected to contain PFAS</i> , such as waterproof or nonstick products	Project team/affected person can review the Safety Data Sheet ^B and if it shows PFAS, product should not be used. If product Safety Data Sheet does not indicate PFAS, confirm with chemist before use
Tier 3: Products that <i>will not come into direct contact</i> with samples and are <i>not expected to contain PFAS</i> , such as ballpoint pens, zipper bags, and body braces	Project team/affected person can review Safety Data Sheet and if no PFAS, then appropriate to use

^A Tier 1 products will undergo the closest scrutiny. It may be necessary to have Tier 1 products analyzed for PFAS to confirm that a specific batch or lot number does not contain PFAS. Alternate products will need to be evaluated/used if PFAS are identified in the product.

^B Safety Data Sheet Check: To evaluate product SDS and/or manufacturing specs, check if the product contains anything with “fluoro” in the name or the acronyms TPE, FEP, ETFE, and/or PFA. If fluorinated compounds are not listed in the manufacturing specs and/or on the Safety Data Sheets, product can be used.

5.0 ATTACHMENTS

Daily PFAS Protocol Checklist Record

NYSDEC Guidelines for Sampling and Analysis of PFAS

DAILY PFAS PROTOCOL CHECKLIST RECORD				
EARTH ENVIRONMENT Engineering and Geology P.C. Two Monument Square, Suite 200 Portland, Maine 04101	PROJECT NAME PROJECT NUMBER INSTALLATION		DATE START TIME WEATHER	
	Field Clothing and PPE (as applicable): ☐ Field crew in compliance with Tables 1 and 2, SOP S6 ☐ Field crew has not used fabric softener on clothing ☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products on exposed body parts this morning ☐ Field crew has not applied unacceptable sunscreen or insect repellant		Sample Containers: ☐ All sample containers made of HDPE or polypropylene. Samples are not stored in containers made of LDPE ☐ Caps are lined or unlined and made of HDPE or polypropylene	
	Field Clothing and PPE (as applicable): ☐ No Teflon® containing materials on-site ☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene ☐ No waterproof field books on-site other than Rite-in-the-Rain® Products		Wet Weather (as applicable): ☐ For personnel in direct contact with samples and/or sampling equipment, wet weather gear made of Vinyl, polyurethane, PVC, latex or rubber-coated materials only	
	☐ No plastic clipboards, binders, or spiral hard cover notebooks on-site ☐ No adhesives (Post-it® Notes) on-site ☐ Coolers filled with regular ice only. No chemical (blue) ice packs in possession		Equipment Decontamination: ☐ “PFAS-free” water on-site for decontamination of sample equipment ☐ Alconox and Liquinox to be used as decontamination materials	
Food and Drink ☐ No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area				
If any applicable boxes cannot be checked, the Field Lead shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day’s work. Corrective action shall include removal of noncompliance items from the investigation area or removal of worker offsite until in compliance. Repeated failure to comply with PFC sample protocols will result in the permanent removal of worker(s) from the investigation area.		Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:		
Sampler Signature: Print Name: Checked By: Date:				



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/techsupportdoc.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/techsupportdoc.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 $4 \pm 2^\circ$ 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 $4 \pm 2^\circ$ 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 $4 \pm 2^\circ$ 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 $4 \pm 2^\circ$ 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

page _____ of _____

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	

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 envelopes, 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	PFDaA	307-55-1
	Perfluorotridecanoic acid	PFTTrDA	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 ethanol	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 6°C upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

SOP # S7

EEEG STANDARD OPERATING PROCEDURE #S7

SURFACE WATER SAMPLING

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 31, 2025

Date

Reviewed

Date

SURFACE WATER SAMPLING

1.0 PURPOSE

The purpose of this technical procedure is to describe the methodology for collecting surface water samples for laboratory analyses and the associated water quality measurements.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data record.

2.0 REFERENCES

U.S. Environmental Protection Agency (EPA), 1987, *Compendium of Superfund Field Operations Methods*, EPA 540/P-87/001a, OSWER 9355.0-14, September.

EPA, 1988, *EPA Guidelines for Conducting Remedial Investigation and Feasibility Studies under CERCLA*, Interim Final OSWER Directive 9355.3-01, August.

De Vera, E.R., B.P. Simians, R.D. Stephens, and D.L. Storm. 1990. *Samplers and Sampling Procedures for Hazardous Waste Streams*. EPA-600/2-80-018.

Korte, N. and P. Kearl. 1984. *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells*. U.S. Department of Energy, Grand Junction, Colorado.

3.0 DEFINITIONS

Surface water – Includes all water on the surface of the ground directly exposed to the atmosphere, including, but not limited to, lakes, ponds, reservoirs, artificial impoundments, streams, rivers, springs, seeps, and wetlands.

4.0 PROCEDURE

This section contains both the responsibilities and procedures involved with surface water sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

Surface water samples may be collected either as composite or discrete samples, as described. Actual sampling locations will be confirmed in the field prior to initiation of the sampling program. Samplers should anticipate accommodating on-site adjustment to changing field conditions. When surface water and sediment samples are collected from the same location, water samples shall be collected first. Refer to **Sediment Sampling SOP (Table A-1)** for sediment sample collection guidance.

4.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and documenting the deviation in the field logbook and/or field data record.

4.2 Preparation

Equipment Selection

For most sites, a decontaminated bottle sampler attached to a pole (e.g. polyvinyl chloride pipe) can be used as the sampling device, or the sample container itself can serve as the sampling device.

There are several more sophisticated sampling devices that can be used to collect water at discrete depths in deep bodies of water (e.g. Van Dorn, Kemmerer). However, for most routine site investigations of shallow lakes, ponds, and streams, this equipment is not necessary.

The following equipment will typically be used during surface water sampling:

- Water Quality Meter for measuring pH, temperature, conductivity (and/or specific conductance), dissolved oxygen (DO) and oxidation/reduction potential (ORP), and a standalone turbidity meter (e.g. Hach),
- Calibration solutions for the water quality parameter probes
- Laboratory-provided sample containers,
- Self-adhesive sample bottle labels,
- High-density polyethylene or stainless-steel, dippers, bailers or another sampling device,
- Appropriate PPE and other health and safety equipment specified in the Health and Safety Plan,
- Previous field notes and blank field data sheets (e.g., sample collection form and Chain of Custody),

- Pen with indelible ink,
- Plastic bags,
- Cooler with ice and,
- GPS receiver (if required).

Pre-Sample Planning

In general, surface water sample locations may include shallow or deep lakes, ponds and other types of impoundments, creeks and streams, ditches, low-lying areas, and intermittently wet drainage areas. These bodies of water may receive contaminant input from surface runoff; groundwater; or from direct discharge through a sluice, ditch, or pipe.

If current information is not available, conduct a reconnaissance of all surface water sample locations to determine accessibility to the water body, depth of water, dangerous conditions (strong currents, boggy bottoms, log jams or beaver dams, waterfalls, steep banks, thick vegetation, etc.), and sampling and personal protection equipment selection criteria. Access to water bodies such as streams may be hampered by thick vegetation, and lakes and ponds that will require the use of a boat may not be accessible by road. Therefore, the logistics of getting sampling equipment and containers to and from the sites must be considered before attempting to sample.

Surface water samples should not be collected sooner than 24-hours after heavy rains because they will not be representative samples reflecting normal (i.e., baseline) conditions.

Surface water samples should be collected from downstream to upstream locations so that if sediments are disturbed it will not affect the subsequent samples. When surface water samples are collected at sediment sample locations, the surface water sample should be collected prior to the sediment sample (which will suspend the fines), no more than 1 foot above the sediment, unless samples are to be collected in a stratified water column.

4.3 Sample Location Selection Considerations

Streams, Tributaries, and Creeks

In moving water bodies such as streams, tributaries, and creeks, sample points should be located where the water is homogeneous both horizontally and vertically. Samples should be taken far enough downstream from the source input for the discharge to be completely mixed. Locations immediately below riffle areas will be vertically mixed and narrow channel areas promote horizontal or cross-channel mixing. Sampling should take place downstream of riffle areas and narrow channel areas where low flow and minimal turbulence conditions are present. The selection of strategically located sample sites may depend on several factors, such as homogeneity, accessibility, intake points for water supplies, stream velocity, and geomorphology.

In general, a single grab sample collected at mid-depth in the center of the channel is adequate to represent the entire mixed cross-section of small streams less than 20 feet wide. If vertical profile samples are specified in the site-specific Field Activities Plan (FAP) for larger and deeper streams or creeks, these samples should be taken from mid-stream just below the surface, at mid-depth, and just above the bottom and composited. The pH, temperature, specific conductivity, and dissolved oxygen should be measured for each sample point when vertical composite samples are collected. Water depth can either be measured with a graduated staff (e.g. yardstick) at shallow depths or with one of various manual or electronic devices available for deeper depths.

Stagnant areas or pools in a stream or creek could contain different contaminant concentrations from the flowing areas, depending on the physical and chemical properties of the contaminant and the proximity of these areas to the source. A sample may be taken at mid-depth to determine if these areas represent contaminant sinks.

Lakes, Lagoons, Ponds, and Impoundments

The selection of representative sample points in standing bodies of water depends on the size, shape, and depth of the basin, and will be specified in the site-specific FAP. Samples can be collected along a vertical transect and/or horizontal grid. The site-specific work plan will designate whether a single mid-point sample, vertical profile samples, or discrete depth samples are required. In larger basins, stratification may inhibit uniform vertical mixing. In these instances, discrete depth samples may be collected at each stratification layer. In smaller basins, such as ponds, lagoons, and impoundments, the entire water column is generally uniformly mixed and one sample at the deepest point may be adequate. The deepest point is usually in the center of small ponds and other containment catch basins. For impoundments with a dam, the deepest point is generally near the base of the dam. Water depth can either be measured with a graduated staff (e.g. yardstick) at shallow depths or with one of various manual or electronic devices for deeper depths.

Wading into the water body to collect samples is not recommended in shallow lakes and ponds. Wading will disturb bottom sediments, which may contaminate the water column resulting in a false positive parameter result. Therefore, a boat is typically used to collect representative water samples in lakes, lagoons, ponds, and impoundments.

4.4 Field Procedures

Sampling Procedures

Laboratory-provided sample containers will be used to directly collect water samples if sample containers do not contain preservatives. Where required by site conditions, remote sampling into sample containers will be allowed by clamping the container onto the end of a clean extension rod. The extension rod must be made of material that does not include contaminants of interest.

Beakers or dippers (i.e. transfer containers), which may be attached to extension rods, may be used if sample containers have preservatives or remote sampling site conditions prevent sampling by direct sample container immersion. The beakers or dippers will be obtained from a scientific instrument supplier so that

the material composition of such a sampling container may be documented. The selected type of transfer device, the composition of this device, and the volume of the device will be recorded on a sample field data record (example **attached**). Alternatively, tubing may be affixed to the extension rod with a sample collected using a peristaltic pump. Bailers may be used if direct access to the sampling point can be reached. Sample transfer containers must be disposable or decontaminated prior to each use. Discrete depth sampling devices may be used when the site-specific FAP directs that specific depth intervals be sampled.

Water quality parameter measurements shall be made using instrumentation and a commercially manufactured flow through cell or direct immersion of the probes into the surface water body. Water quality parameter instruments will be calibrated daily as per the manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (example **attached**).

Equipment Decontamination

Before sampling begins, reusable sampling devices (e.g. metal bailers, beakers, dippers, etc.) shall be decontaminated. Mobile decontamination supplies may be utilized so that equipment can be decontaminated on-site. Each piece of sampling equipment shall be decontaminated before sampling operations and between sampling locations. Decontamination of field equipment will be performed in accordance with the **Equipment Decontamination SOP (Table A-1)**. Typically, decontamination will consist of scrubbing equipment with potable water and Alconox® followed by a scrub with deionized (DI) water and a final deionized water rinse. The FAP should specify decontamination requirements.

General Surface Water Sampling Procedures

- Samples will be collected first from areas that are suspected of being the least contaminated to minimize the risk of sample cross-contamination. Typically, in flowing water bodies, sampling shall progress from downstream to upstream to avoid sediment disturbance affecting subsequent samples.
- Prior to sampling, the water body characteristics (e.g. size and depth) should be observed and described in the field logbook. Observations that should be noted include:
 - Estimate of surface area of water body
 - Surface water and site conditions (e.g. floating oil or debris, gassing)
 - Location of any discharge pipes, sewers, or tributaries
 - Weather observations (e.g. wind speed, is it sunny or cloudy, and approximate wave height)
- Collect X-Y coordinates of the sample location using a portable global positioning system (GPS) instrument. If a GPS is ineffective due to the terrain or tree canopy, mark the location in the field with a stake or flag and document the location in the field logbook to allow identification of location on aerial photograph, if possible.
- Don a clean pair of nitrile or equivalent gloves.

- Surface debris (i.e. sticks, leaves, vegetation) will be cleared from the sample location prior to sample collection, taking care not to disturb bottom or bank sediments.
- Measure water quality parameters (pH, dissolved oxygen, specific conductivity, and temperature) at each sample location prior to collecting a water sample. Samples for water quality parameters will be collected either through direct immersion of water quality probe or collection of water in a separate container at a like location and depth as the samples for laboratory analysis.
- Collect the sample in accordance with the appropriate method-specific procedures outlined in section 4.5 of this SOP.
- Identify, handle, and document the samples in accordance with the QAPP and the **Chain of Custody SOP (Table A-1)**.
- Document the sampling event on a Surface Water Sample FDR. Including:
 - Distance of sample collection point from right or left edge of water (include cardinal direction).
 - Water depth.
 - Sample depth interval.
 - Sample collection method (grab, discrete)

Note: Collection of surface water samples in deep-water areas may require the use of a boat. The Health and Safety Manager or Site Coordinator shall be consulted for additional health and safety requirements.

4.5 Method Specific Sample Collection Procedures

Samples Collected by Container Immersion

Surface water sample collection by container immersion will be conducted in accordance with the following procedures:

- The outside of all capped sample containers shall be triple rinsed with the surface water being sampled before filling the containers with the sample to be analyzed.
- Submerge the sample container or transfer container below the water surface with minimal surface disturbance and with the open end pointed upstream.
- If possible, the sample container or transfer container will be lowered no closer than 3 to 6 inches above the bottom sediments.
- Note: sample containers with preservatives should not be collected by the container immersion method.

Samples Collected by Dipper

Surface water sample collection with a dipper on an extension rod will be conducted in accordance with the following procedures:

- A disposable dipper or decontaminated dipper container will be used.
- Depth of water at each sampling site will be measured and the dipper will be lowered using the extension rod to the appropriate sampling location in accordance with the FAP.
 - If possible, the dipper will be lowered no closer than 3 to 6 inches above the bottom sediments.
- The dipper will be inserted facing downstream and withdrawn very slowly and carefully to avoid agitation of the bottom sediments; and
- Transfer the sample from the dipper directly into the sample container. Minimize aeration of the sample as much as possible.

Samples Collected by Peristaltic pump

Surface water sample collection with a peristaltic pump will be conducted in accordance with the following procedures:

- Disposable tubing will be attached (e.g. zip tied) to a decontaminated extension rod.
- Depth of water at each sampling site will be measured and the tubing intake will be lowered to the appropriate sampling location in accordance with the FAP.
 - If possible, the tubing intake will be lowered no closer than 3 to 6 inches above the bottom sediments.
- The tubing will be connected to the peristaltic pump head and pre-sample purging will begin.
 - an appropriate purge rate will be selected to avoid disturbance of the bottom sediments and to prevent volatilization of the sample
 - Purging will occur for a minimum of time to completely purge the tubing volume 5x, generally 1 minute of purging will suffice
- The sample will be collected by pumping directly into the sample container.

Samples Collected by Bailer

Surface water sample collection with a bailer will be conducted in accordance with the following procedures:

- A disposable high-density polyethylene bailer or equivalent will be used.

- Depth of water at each sampling site will be measured and the bailer will be lowered to the appropriate sampling location in accordance with the FAP.
- If possible, the bailer will be lowered no closer than 3 to 6 inches above the bottom sediments.
- The bailer will be inserted facing downstream and withdrawn very slowly and carefully to avoid agitation of the bottom sediments; and,
- Transfer the sample from the bailer directly into the sample container. Minimize aeration of the sample as much as possible.

Samples Collected by Discrete Depth Sampling Devices

Surface water sample collection with a discrete depth sampling device will be done in accordance with the following procedure:

- A Van Dorn, Kemmerer sampler or equivalent will be used.
- Depth of water at each sampling site will be measured and the sampling device will be lowered to the appropriate sampling depth in accordance with the site-specific work plan.
- If possible, the sampling device will be lowered no closer than 3 to 6 inches above the bottom sediments.
- The sampling device will be lowered facing upstream and opened once at the desired sampling depth. The device will be withdrawn very slowly and carefully to avoid agitation of the bottom sediments.
- Transfer the sample from the device directly into the sample container. Minimize aeration of the sample as much as possible.

5.0 ATTACHMENTS

Water Grab Sampling Record

Surface Water and Sediment Sampling Record

Field Instrument Calibration Record

SURFACE WATER AND SEDIMENT SAMPLING RECORD

EARTH ENVIRONMENT

Engineering and Geology P.C.

2 Monument Square, Suite 200, Portland Maine 04101

PROJECT NAME	
PROJECT NUMBER	
SAMPLE ID	SAMPLE TIME

SAMPLE LOCATION	DATE
START TIME	END TIME
SITE NAME/NUMBER	PAGE OF

SURFACE WATER DATA

WATER DEPTH AT SAMPLE LOCATION _____ FT.
 DEPTH OF SAMPLE BELOW WATER SURFACE _____ FT.
 FLOW RATE _____ ML/MIN

WATER QUALITY PARAMETERS:

TEMPERATURE _____ °C
 SPEC. COND. _____ mS/cm
 PH _____ pH Units
 ORP _____ mV
 TURBIDITY _____ NTUs
 DO _____ mg/L

☐ WINKLER METHOD
☐ DO PROBE

EQUIPMENT USED:

☐ BEAKER
☐ BOTTLE
☐ PACS BOMB
☐ PUMP
☐ FILTER
 No. _____ Type: _____

☐ FIELD DUPLICATE COLLECTED
 DUP. ID _____

TYPE OF SURFACE WATER:

☐ STREAM
☐ RIVER
☐ LAKE
☐ POND
☐ SEEP

FIELD SKETCH SHOWN/ATTACHED

☐ YES ☐ NO

DECON FLUIDS USED

☐ ALL USED
☐ LIQUINOX/DI H₂O SOLUTION
☐ DEIONIZED WATER
☐ POTABLE WATER
☐ NITRIC ACID
☐ HEXANE
☐ 25% METHANOL/75% ASTM TYPE II H₂O
☐ ETHYL ALCOHOL

SAMPLING EQUIPMENT

WATER QUALITY METER MODEL NO. _____ UNIT ID NO. _____
 TURBIDITY METER MODEL NO. _____ UNIT ID NO. _____

SEDIMENT SAMPLE INFORMATION

TYPE OF SAMPLE

☐ DISCRETE
☐ COMPOSITE

QC SAMPLES

☐ DUPLICATE _____
☐ EQ BLK _____

MS/MSD:
☐ YES
☐ NO

SAMPLE INTERVAL:

TOP _____
 BOTTOM _____

TYPE OF MATERIAL:

☐ ORGANIC
☐ SAND
☐ GRAVEL
☐ CLAY
☐ FILL
☐ OTHER _____

COLLECTION EQUIPMENT

☐ HAND AUGER/CORER
☐ S.S. SPLIT BARREL
☐ ALUMINIUM PAN
☐ S.S. SHOVEL
☐ HAND SPOON/SPATULA
☐ S.S. BUCKET
☐ OTHER _____

SAMPLE OBSERVATIONS

ODOR _____
 COLOR _____
 OTHER _____
 PID _____

DECON FLUIDS USED

☐ ALL USED
☐ LIQUINOX/DI H₂O SOLUTION
☐ DEIONIZED WATER
☐ POTABLE WATER
☐ NITRIC ACID
☐ HEXANE
☐ 25% METHANOL/75% ASTM TYPE II H₂O
☐ ETHYL ALCOHOL

FIELD SKETCH SHOWN/ATTACHED

☐ YES
☐ NO

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____
☐	_____	_____	_____	_____	_____	_____	_____

NOTES/SKETCH

Sampler Signature:

Print Name:

Checked By:

Date:

Deviations from the work Plan:

GRAB SAMPLING RECORD - WATER

**EARTH
ENVIRONMENT**
Engineering and Geology P.C.

2 Monument Square
Suite 200
Portland, Maine 04101

PROJECT NAME	
PROJECT NUMBER	
SAMPLE ID	SAMPLE TIME

LOCATION ID	DATE
START TIME	END TIME
SITE NAME/INSTALLATION	PAGE OF

SAMPLE TYPE: ☐ GROUNDWATER ☐ SURFACE WATER ☐ STORM WATER ☐ DRINKING WATER ☐ PORE WATER ☐ OTHER: _____

FIELD PARAMETERS WITH PROGRAM STABILIZATION CRITERIA

TIME	DTW (FT)	PURGE RATE (mL/min)	TEMP. (°C) ±3%	SP. CONDUCTANCE (mS/cm) ±3%	DISS. O ₂ (mg/L) ±10% or 3 values <0.5 mg/L	pH (units) ±0.1	REDOX (mv) ±10 mv	TURBIDITY (ntu) ±10% or <10 ntu	PUMP INTAKE DEPTH (ft)	COMMENTS

FINAL STABILIZED FIELD PARAMETERS (rounded to appropriate significant figures)

										TEMP.: nearest degree (ex. 10.1 = 10) COND.: 3 significant figure (SF) max (ex. 1.686 = 1.69) pH: nearest tenth (ex. 5.53 = 5.5) DO: nearest tenth (ex. 3.51 = 3.5) TURB: 3 SF max, nearest tenth (6.19 = 6.2, 101 = 101) ORP: 2 SF (44.1 = 44, 191 = 190)

EQUIPMENT DOCUMENTATION

<u>TYPE OF PUMP</u> ☐ PERISTALTIC ☐ SUBMERSIBLE ☐ BLADDER _____ ☐ PDB ☐ HYDRASLEEVE ☐ OTHER _____	<u>DECON FLUIDS USED</u> ☐ ALCONOX ☐ DEIONIZED WATER ☐ POTABLE WATER ☐ NITRIC ACID ☐ HEXANE ☐ METHANOL ☐ OTHER _____	<u>TUBING/PUMP/BLADDER MATERIALS</u> ☐ SILICON TUBING ☐ HDPE TUBING ☐ LDPE TUBING ☐ OTHER _____ ☐ OTHER _____	<u>EQUIPMENT USED</u> ☐ S. STEEL PUMP MATERIAL ☐ PVC PUMP MATERIAL ☐ GEOPROBE SCREEN ☐ OTHER _____ ☐ OTHER _____ ☐ OTHER _____	☐ WL METER _____ ☐ PID _____ ☐ WQ METER _____ ☐ TURB. METER _____ ☐ PUMP _____ ☐ OTHER _____ ☐ FILTERS NO. _____ TYPE _____

ANALYTICAL PARAMETERS

PARAMETER	METHOD NUMBER	ANALYTE LIST	FIELD FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	QC COLLECTED

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED YES ☐ NO ☐ NUMBER OF GALLONS GENERATED _____

NO-PURGE METHOD UTILIZED YES ☐ NO ☐

NOTES:

DEVIATIONS FROM THE WORK PLAN:

Sampler Signature:

Print Name:

Checked By:

Date:

SOP # S8

EEEG STANDARD OPERATING PROCEDURE #S8

CHAIN OF CUSTODY PROCEDURES

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Tige Cunningham, NRCC-EAC, QA Officer

August 28, 2025

Date

Reviewed

Date

CHAIN OF CUSTODY PROCEDURES

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to describe the chain of custody procedures and sample handling considerations when collecting environmental samples at a site. This SOP also describes a tiered approach that should be used to assist with field decisions. This procedure applies to all EEEG personnel and subcontractors who collect or otherwise handle samples of environmental samples and should be reviewed by all on-site personnel prior to implementation of field activities.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure in planning or in the execution of planned activities must be approved by the project manager.

2.0 REFERENCES

American Society for Testing and Materials. 1996. Standard Guide for Sampling Chain-of-Custody Procedures. D 4840-95.

3.0 DEFINITIONS

Chain of Custody Record – legal documentation of custody of sample materials and instructions for analytical laboratory.

Custody – physical possession or control. A sample is under custody if it is in possession or under control so as to prevent tampering or alteration of its characteristics.

Sample Label – a record attached to samples to ensure legal documentation of traceability.

4.0 PROCEDURES

Field data sheets and chain of custody records must be completed by the appropriate sampling personnel for each sample. The objectives of the EEEG chain of custody program are to ensure:

- Samples are uniquely identified.
- samples are collected for all scheduled analyses.
- the correct samples are analyzed for requested analyses and are traceable to their records.
- descriptions of important sample characteristics and field observations are recorded.
- samples are protected from loss and/or are identified if damaged.
- alteration of samples (e.g., filtration, preservation) is documented.
- a forensic record of sample integrity is established.

- sample security is maintained; and
- relevant field information is recorded including location, sample number, date and time, identification of field samples, and individuals collecting the samples.

Field data records, sample labels and chain of custody forms are used to document identification and handling of samples from the time of collection through the completion of chemical analysis. In some projects, analytical data may be used in litigation. Accountability of the history of a sample must be available to demonstrate that the data are a true representation of the environment. The chain of custody record is used as evidence in legal proceedings to demonstrate that a sample was not tampered with or altered in any way that may bias the analytical accuracy of the laboratory results. It is extremely important that chain of custody records be complete, accurate and consistent.

4.1 Responsibilities

Project Manager

The project manager (PM) shall provide the Quality Assurance Program Plan (QAPP) and is responsible for the overall compliance with this SOP.

Field Operations Lead

The field operations lead shall ensure that the samples are correctly collected, labeled, tracked by chain-of-custody, and stored until they are delivered directly to the shipper or laboratory (i.e., on-site or off-site).

Field Personnel

Field personnel (sample collectors) shall ensure the samples are correctly collected, labeled, tracked by chain-of-custody, and stored until they are delivered directly to the field operations lead or laboratory (i.e. on-site or off-site). The sample collector shall maintain custody of the samples until they are relinquished to the field operations lead or laboratory. The sample collector shall be responsible for informing the field operations lead of sampling conditions and if any of the samples are potentially hazardous. Appropriate comments should be made on the chain of custody form to inform the laboratory of potentially hazardous samples which will provide a more efficient testing method.

4.2 Chain of Custody Protocol Consideration

The chain of custody protocol followed by the sampling personnel involves the following steps:

- recording sampling locations, sample bottle identification, and specific sample collection procedures on the appropriate field data records.
- using pre-prepared sample labels that contain all information necessary for effective sample tracking; and
- completing standard chain of custody forms to establish analytical sample custody in the field before sample shipment.

Sample Custody

Sample custody procedures are designed to ensure that sample integrity is maintained from collection to final disposition. A critical aspect of sound sample collection and analysis protocols is the maintenance of strict chain of custody procedures as described in this SOP. The chain of custody procedures include tracking and documentation during sample collection, shipment, and laboratory processing. A sample is considered to be in an individual's custody if it is (1) in the physical possession of the responsible party; (2) in view of the responsible party after being in their possession (3) secured to prevent tampering; or (4) placed in a designated, secure area that is controlled and restricted by the responsible party.

Custody will be documented throughout all sampling activities on the chain of custody record for each day of sampling. This record will accompany the samples from the site to the laboratory. Field operations leads or other designated personnel are required to sign, date, and note on the record the time when relinquishing samples from their custody. Any discrepancies will be noted at this time. Samples will be shipped to subcontract laboratories via overnight air courier (e.g. FedEx or other approved shipping carrier). Shipping tracking numbers will be used as custody documentation during this time and will be retained as part of the permanent sample custody documentation. In some cases, samples may be hand delivered to the laboratory; hand delivery will be noted on the chain of custody form. The subcontractor laboratory is responsible for sample custody once samples are received.

Sample Labels

Each sample container will be affixed with a self-sticking, waterproof, adhesive label. Each contracted laboratory will provide sample labels for every sample container. Each label shall be completed with a pen of indelible ink and contain the following information:

- Client Name: EEEG
- Site Name: "Site Name" for the sampling event
- Client Sample ID: 828133-SD30, for example
- Date collected: (month/day/year)
- Sample Time given as military time (for example: 1400)
- Name/Initials of Collector: EEEG Field Sampler
- Analytical method/analyte request (for example, VOCs - 8260)
- Preservative: (for example – None, HNO₃, H₂SO₄, NaOH, HCl, Na₂S₂O₃, or Other)

Chain of Custody Record

Chain of custody forms will be used to document the integrity of all samples to maintain a record of sample collection, transfer of samples between personnel, shipment of samples, and receipt of samples at the laboratory, chain of custody forms will be filled out for each sample/analysis at each sampling location. The chain of custody forms shall include the following information:

- Project name and project number if applicable.
- Project PM contact information.
- Name and address of laboratory to receive the samples.

- Chain of custody control number.
- Sample type, sample method.
- Location ID, sample ID.
- Sample collection date and time.
- Matrix code.
- Analyses requested.
- Field QC for matrix spike (MS)/matrix spike duplicate (MSD), if applicable.
- Container type, size and number.
- Preservatives used.
- Data deliverable type.
- Field sampling personnel names and initials.
- Turn-around-time for laboratory analysis; and,
- Comments to the laboratory, if applicable.

The FOL will perform the following duties:

- Receive the samples from the sample collector(s).
- Check sample labels against the FDRs or other sample collection documentation.
- Complete the chain of custody entry for each sample.
- Sign and enter the date and time relinquished to the shipper; and,
- Prepare the samples for shipment from the field to the laboratory.

The field operations lead will sign the "Sampled By" and "Relinquished By" fields on the chain of custody record, marking the date and time custody is transferred to the shipping agency or other authorized person (e.g. courier or laboratory).

Any corrections to the chain of custody form entries will be made by a single-line strike mark through the incorrect item, and then entering the correct entry adjacent to the strikeout item. Corrections will be initialed and dated by the person making the change.

The original chain of custody will be sealed in a plastic bag and taped to inside lid of the shipping container (e.g. sample cooler). A copy of the chain of custody will be sent to the PM as a scanned image or picture if equipment is unavailable for scanning. Any hard copies (e.g. carbonless copy paper duplicate records) will be retained by the field operations lead and placed in the project files upon completion of the field program.

Overnight Sample Storage

In some cases, samples that cannot be shipped immediately to a laboratory must be temporarily stored on ice in a secured location or in a EEG controlled sample refrigerator until arrangements can be made for delivery. A temperature blank must accompany samples.

SOP # S10

EEEG STANDARD OPERATING PROCEDURE #S10

SEDIMENT SAMPLING PROCEDURES

August 29, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 29, 2025

Date

Reviewed

Date

SEDIMENT SAMPLING PROCEDURE

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes guidelines and procedures for use by field personnel in the collection and documentation of sediment samples for chemical and physical analysis. This SOP does not include the procedures and equipment selection for sediment sampling for biological analysis, which is very specific to the aquatic environment and type of analysis (toxicological and bioaccumulation tests, benthic community analysis, etc.), This SOP is only applicable to bedload sediment sampling and does not include suspended load sampling.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

ASTM International (ASTM), 1995, *Standard Guide for Core Sampling Submerged, Unconsolidated Sediments*, ASTM D 4823-95, reapproved 2019.

EPA, 2001, *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual*, Office of Water, EPA 823-B-01-002.

EPA, 2020, *Sediment Sampling*, Region 4 Laboratory Services and Applied Science Division, Operating Procedure, Number LSASDPROC-200-R4, February.

3.0 DEFINITIONS

Sediment – Sediment is generally considered as unconsolidated mineral and organic deposits found underwater, such as on the bottom of rivers, streams, creeks, ponds, lakes, lagoons, and estuaries or deposited by a water body. Broadly speaking, sediment is “eroded material which lies below surface water the majority of the time where the surface water is capable of providing for an aquatic biota habitat.”

Disturbed Sediment Sample – A sediment sample where the in situ physical structure and fabric has been disturbed as the direct result of sample collection. Disturbed sediment samples can be collected using hand augers, spoons, or scoops.

Undisturbed Sediment Sample – A sediment sample who’s in situ physical structure and fabric has not been disturbed as the result of sample collection. Undisturbed sediment samples can be collected using the core samplers.

Grab Samples – A disturbed sediment sample that is collected by using such devices as the sample container (e.g., wide-mouth jar), or a stainless-steel spoon, scoop, or hand auger, and is representative of the current conditions at the location sampled.

Composite Samples – Composite samples are comprised from at least two grab samples that are thoroughly mixed in a decontaminated bowl to be representative of an area, transect, or vertical section. The result typically is considered an average concentration of the area or column of sediment sampled.

4.0 PROCEDURE

This section contains both the responsibilities and procedures involved with sediment sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

4.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and documenting the deviation in the field logbook and/or field data record.

4.2 Preparation

Equipment Selection and Sampling Objective Considerations

Several devices are available for the collection of sediment samples, the proper selection of which is dependent on:

1. the sampling objectives,
2. whether the sediment is above or below water,
3. the sediment thickness
4. the depth of water above the sediment,
5. the accessibility and conditions of the sampling locations, and
6. the analytical requirements.

Therefore, it is prudent to conduct a site visit to the sampling locations before the development of the work plan. Two types of sediment sampling devices will typically be used: core samplers and grab samplers. Most of these devices are constructed of stainless steel, and some core samplers allow a disposable sleeve to be inserted into the core barrel to retain the sample. The sleeve should be made of high-density polyethylene or acetate. Teflon or low-density polyethylene should not be used.

Core Samplers

The collection of submerged sediment samples and most sediment deposits above water (both grab and composite samples) may be conducted with a core sampler. The advantage of a core sampler over a grab sampler is that discrete and minimally disturbed samples can be collected with no loss of the finer grained material as the sample is raised to the surface (ASTM, 2019). The simplest core sampler is a hand-driven, hollow, stainless steel or polycarbonate core barrel, with a beveled edge on the head assembly at the leading end and a check valve or flapper valve at the opposite end to keep the sample in the barrel by partial vacuum (end-filling type). The trailing end has a T-handle to push and/or twist the core barrel into the soft sediment. Core barrels are typically 1- to 2-inches in diameter and are available in 2- and 4-foot lengths. For deeper submerged sediments (> 2 feet), usually collected from a boat, handle extensions can be added to the top of the hand core sampler.

A sample sleeve, or core liner can be inserted into some core samplers to obtain discrete samples that are handled and shipped in the sleeve. Upon extrusion from the core barrel, cores can be subsampled or homogenized. One disadvantage to core samplers is that the volume of sediment retrieved in one core barrel may be insufficient if full suites of analyses are needed, thus requiring multiple cores to be collected at each location.

Grab Samplers

Grab samplers will disturb the sediment during collection, which may be a limiting factor for some sampling parameters and objectives. If sampling dry to moist surficial sediments is the sampling objective, then a sample can be collected by using grab samplers such as stainless-steel hand augers, spoons, or scoops, or the sample containers themselves. If sampling shallow submerged sediment (< 6 inches deep), then the sample container may be used as the preferred collection device to minimize loss of fines upon raising the sample to the surface. The lid of the sample container may be used to cover the mouth of the sample container before raising it to the surface.

For deeper submerged sediments (> 2 feet), usually collected from a boat, a Ponar grab sampler or equivalent is an option for surficial deposits. This type of sampler has a jaw-type mechanism that is tripped from above in order to close the jaws and collect the sample. The dredge is lowered slowly through the water to the sediment with the jaws in the open position. As the dredge is retrieved, the jaws close and the isolated sediment is brought to the surface. The disadvantage to using these grab samplers is that a pebble or stick can often prevent the jaws from shutting completely, and the sample will be washed or lost upon raising the sampler to the surface. If sample collection is not successful using a grab sampler, then use of a core sampler may be required.

Additional Sampling Equipment

In addition to the chosen sampling devices described above, sediment sampling will generally consist of the following equipment:

- Personal protection equipment
- Rubber boots or waders
- Stainless steel bowls, spoons, spatulas, if compositing or homogenizing samples
- Decontamination supplies (e.g., deionized water, Liquinox® soap, paper towels)
- Documentation material (pens, logbook, Field Data Records [**example attached**])
- Sample containers and cooler (provided by the laboratory)
- Ice for sample preservation
- Clean plastic sheeting
- Paper towels

Field Sample Planning

If current site information is not available, conduct a reconnaissance of all sediment sampling locations to determine:

- accessibility of the water body,
- depth of water,
- potentially dangerous conditions (strong currents, boggy bottoms, log jams or beaver dams, waterfalls, steep banks, thick vegetation, etc.),
- sediment accumulation points to flag for sampling (e.g. pools, convex side [outer side] of meanders, mid-channel islands, downstream side of boulders, deltas, etc.), and
- sampling and personal protection equipment selection criteria.

Access to water bodies such as streams may be hampered by thick vegetation, and lakes and ponds that will require the use of a boat may not be accessible by road. Therefore, the logistics of getting the sampling equipment and containers to and from the sites must be considered before attempting to sample.

The timing of sediment sampling relative to stream flow is critical, even when fluctuation in stream flow is not a variable of concern in the project objectives. Avoid sampling during high water or flood conditions, not only for safety reasons, but also because most sediment deposits will be submerged under deeper water, will be eroding due to turbulent flow, and will be migrating and/or in suspension. If the same locations are being sampled on a periodic basis (e.g., quarterly, semi-annually, yearly), it is critical to sample under the same flow conditions (e.g., base flow) each time.

Plan to collect sediment (and co-located surface water) samples along a water body in the upstream direction, starting from the most downstream sampling location. This procedure will ensure that any

mobilized contaminants or fine particles from sampling activities, which will migrate downstream, do not affect the representativeness of the subsequent samples. This procedure must be followed even in lakes or ponds that are stream fed.

Select biased locations where sediment occurs. Transects may have to be diagonal to stream flow instead of perpendicular to include point bars on opposite sides. For establishing a grid or transects in a lake, placing buoys at the nodes/sampling locations works well. At small ponds, transects can be marked by stretching a cord or cable between stakes on opposing shores, using turnbuckles to provide tautness and flagging tape to mark sampling locations.

If accessing and reaching the sampling locations is difficult, taking a portable global positioning system (GPS) instrument to obtain X-Y coordinates during sampling is recommended, to avoid repeating trips. Such difficult locations will be costly to land survey. If a GPS is ineffective due to the terrain or tree canopy, marking the locations on a topographic map or aerial photograph at the time of sampling is the next best alternative.

When surface water samples are collected at sediment sampling locations, collect the surface water prior to the sediment sample (which will suspend the fines), no more than 1 foot above the sediment, unless samples are to be collected in a stratified water column as specified in the site-specific work plans. See Surface Water Sampling SOP (SOPs listed in Table A-1) for further details on surface water sampling methodology.

When selecting a boat to access sampling locations on lakes, ponds, or rivers, make sure the hull design will not disturb the bottom and is stable enough to haul loaded samplers to the surface (flat vs V-shaped). Jon boats or small pontoons work well in most situations. Care must be given to avoid disturbing the bottom near the sampling locations with oars or a motor's propeller. If necessary, use two anchors to anchor both ends of the boat to prevent rotation during sampling.

Prior to sampling, decontaminate non-disposable sample equipment according to the Field Equipment Decontamination SOP (SOPs listed in Table A-1) and procedures outlined in the site-specific FAP.

4.3 Field Procedures

1. Review carefully the Site Health and Safety Plan (HASP) and appropriate Activity Hazards Analysis.
2. Don appropriate personal protection equipment, such as tall rubber boots or waders and personal flotation devices, as specified in the site-specific FAP, prior to entering the water. A walking stick or trekking pole is often needed when wading in unclear water, to probe the bottom for sure footing and depth of water.
3. Due to uneven terrain, water hazards (currents, holes, ice, drowning, etc.), hazardous biota (snakes, spiders, stinging nettles, etc.), remoteness, and the hauling of equipment, gear, and sample containers, always sediment sample as a team of at least two personnel, with one team member as a site health and safety officer.

4. Approach submerged sampling locations from downstream and collect the sample facing upstream. Wading disturbs the sediment bottom and the suspended fine-grained material migrates downstream.
5. Never wade in water deeper than 2 feet, and generally no deeper than the top of the knee. Instability increases in deeper water, especially in a current, and it becomes more difficult to sample. If the water is not clear (unable to see the bottom), proceed with extreme caution, probing the bottom ahead with a walking stick for depth and unevenness. One of the team members should stay on or close to shore to hand equipment and supplies back and forth. If deemed necessary, the sampler may need to don a seat harness and be on a safety rope that is controlled by the other team member.
6. When using a hand coring device, slowly push the corer into the sediment until there is a noticeable resistance (usually indicating the channel or basin floor), or until the top of the core barrel is at the sediment surface.
7. For sediment sampling using a boat, gently lower all grab and core samplers to the bottom so as not to create a bow wave and disturb the fine sediment on the bottom. After the sample is collected at a given location, measure the depth of water with a weighted fiberglass tape and record this information on the sample field data record (**example attached**). These data are also useful for profiling the bottom of the water body (e.g., lake or pond).
8. Retrieve the sampling device slowly through the water to avoid washout by creating turbulent flow. Immediately extrude (for core samplers) or directly transfer (for grab samplers) the sample to a stainless-steel bowl and check to see that sediment recovery is acceptable (no visible signs of sediment loss or washing). If sediment recovery is unacceptable or the volume is insufficient, collect another sample close to, but upstream of, the previous attempt.
9. Unless collecting a sample for volatile organic compound (VOC) analysis, thoroughly homogenize the collected sediment sample in a mixing bowl (due to the stratified nature of sediment deposits), whether from a grab or core sampler, after removing excess water (being careful not to lose the fines in the process), rocks, sticks, leaves, and other organic debris. Then transfer the sediment into the sample containers using a stainless-steel spoon or spatula. Fill the sample container such that little to no headspace exists.
 - a. Samples for VOCs should be collected without homogenization directly from the sampler or immediately after transfer to the stainless-steel bowl.
10. Collect X-Y coordinates of the sample location using a portable GPS instrument. If a GPS is ineffective due to the terrain or tree canopy, mark the location in the field with a stake or flag and indicate the sample location on the site map.

11. Appropriately label and number the sample containers. The label will be filled out with a pen containing indelible ink and will contain, at a minimum, the following information:
 - a. Project number
 - b. Location ID
 - c. Sample number
 - d. Sample location
 - e. Sample depth
 - f. Sample type
 - g. Date and time of collection
 - h. Parameters for analysis
 - i. Sampler's initials
12. Document the sampling event on a sediment sample collection field data record (**example attached**). Note any pertinent field observations, conditions, or problems on the field data record and in the field book.
13. Any encountered problems (access issues, flooding by beaver dams, etc.) or unusual conditions should also be immediately brought to the attention of the field operations lead and PM.
14. Appropriately preserve, handle, package, and ship the samples in accordance with the chain of custody SOP (See SOP Table A-1), the QAPP, and the site-specific FAP.

5.0 ATTACHMENTS

Surface Water and Sediment Sampling Record

SOP # S11

EEEG STANDARD OPERATING PROCEDURE #S11

DESCRIPTION AND IDENTIFICATION OF SOIL SAMPLES

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 31, 2025

Date

Reviewed

Date

DESCRIPTION AND IDENTIFICATION OF SOIL SAMPLES

1.0 PURPOSE

This Standard Operating Procedure (SOP) is to be used for field descriptions of soil observed in natural exposures, in exploratory excavations, and in test boring samples. Field descriptions are typically based on macroscopic visual observations (i.e., with no magnification).

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

ASTM International (ASTM), 2014. Standard Terminology Relating to Soil, Rock, and Contained Fluids; ASTM D653-14.

ASTM, 2017. Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); ASTM D2487-17e1.

ASTM, 2017. Standard Practice for Description and Identification of Soils (Visual-Manual Procedure); ASTM D2488-17e1, Philadelphia, PA.

3.0 PROCEDURE

Soil will be classified in accordance with the Unified Soil Classification System (ASTM D2488). A summary of this system is attached. For environmental investigations, the hydrogeologic characteristics of the soil are generally more important than its mechanical properties. Soil descriptions should include the following minimum information (where applicable and obtainable) and logged in the following order (with examples):

- 1) **Name** (SAND, silty GRAVEL, etc. including portions- little, trace, some, etc.)
- 2) **Gradation** (well-graded, poorly graded, uniform, etc.) or **Plasticity** (non-plastic, slightly plastic, etc.)
- 3) **Consistency/Density** (if available from SPT blow counts)
- 4) **Moisture** (dry, damp, moist, wet, saturated)
- 5) **Color** (Munsell color chart if available)
- 6) **Structure** (layering, fractures, cracks, etc.)
- 7) **Geologic Origin** (e.g., till, lake deposit, loess) and/or formal or local name (e.g., Magothy Formation, Gardiners Clay, Lloyd Sand Member). Formal and local names should only be used based on professional judgement and knowledge of the local geology.
- 8) **Unified Soil Classification Symbol (USCS)**. Refer to **Attachment**.

Additional details on some of the descriptors are included below.

Name

Based principally on gradation (e.g. grain size) characteristics. Grain sizes encountered during environmental investigations include:

Unified Soil Classification System (USCS)			
	MILLIMETERS	INCHES	SIEVE SIZES
BOULDERS	> 300	> 11.8	-
COBBLES	75 - 300	2.9 - 11.8	-
GRAVEL:			
COARSE	75 - 19	2.9 - .75	-
FINE	19 - 4.8	.75 - .19	3/4" - No. 4
SAND:			
COARSE	4.8 - 2.0	.19 - .08	No. 4 - No. 10 
MEDIUM	2.0 - .43	.08 - .02	No. 10 - No. 40 
FINE	.43 - .08	.02 - .003	No. 40 - No. 200 
FINES:			
SILTS	< .08	< .003	< No. 200
CLAYS	< .08	< .003	< No. 200 

The predominant (>50%) grain size should be written in capital letters (e.g. SAND, SILT, GRAVEL).

Include rough percentages for the secondary, tertiary, etc. grain sizes (particles >3 inches [cobbles], coarse/fine gravel, coarse/medium/fine sand, and fines) or qualitative particle size descriptions. Qualitative descriptions are most used and provide further definition by using specific terms to describe major and minor soil constituents as follows:

- Name = major component (e.g. SAND)
- Name modifier (added as a prefix) = 35 to 50% of soil fraction (e.g. clayey, silty, sandy, gravelly)
- With some = 20 to 35% of soil fraction (e.g. some clay)
- With little = 10 to 20% of soil fraction (e.g. little clay)
- With trace = 1 to 10% of soil fraction (e.g. trace silt)

Gradation

Coarse vs Fine grained soils

Coarse- and fine-grained soils are described differently in the USCS, and although based on specific grain measurements, field crew can approximate grain size based visual observations and comparison to USCS figure included above. Coarse grained soils (sands and gravels) are defined as soils in which greater than 50% of the soil fraction is retained on a #200 sieve. Fine grained soils (silts and clays) are defined as soils in which greater than 50% of the soil fraction will pass through a #200 sieve.

Coarse grained soils are further broken down as having little or no fines (<12% passing the #200 sieve) or appreciable amounts of fines (>12% passing the #200 sieve). For coarse-grained soils that contain little or no fines, the overall gradation is characterized as follows:

- **Well graded** soils are soils whose coarse fraction has a wide and continuous gradation of grain sizes
- The coarse fraction of **poorly graded** soils has a limited range of grain sizes.
- The coarse fraction of **uniform** soils is essentially equigranular.

For fine-grained soils state whether the fines are predominantly **silt** or **clay**. The field classification of fine-grained soil relies on the qualitative determination of plasticity and cohesiveness characteristics (refer to Attachment S11A and see below). The determination is complex and may not be necessary for soil descriptions for most environmental investigations.

Consistency

Describe the consistency of the soil. For soil samples obtained using the Standard Penetration Test (split spoon sampling with a standard hammer – See SOP S16 for details), the terminology to be used is as follows:

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
CONSISTENCY	BLOWS/FOOT ¹	CONSISTENCY	BLOWS/FOOT ¹
Very loose	0 to 4	Very soft	0 to 2
Loose	5 to 10	Soft	2 to 4
Medium dense	11 to 30	Firm	4 to 8
Dense	31 to 50	Stiff	8 to 15
Very Dense	> 50	Very stiff	15 to 30
		Hard	> 30

¹ Blows per foot (Standard Penetration Resistance) = number of blows required to drive a 2-inch OD by 1-3/8-inch ID split-spoon sampler with 140-pound hammer falling 30 inches, after initial penetration of 6 inches.

For non-standard penetration test sampling, consistency (density) values should not be recorded for coarse grained soils. Fine grained soils may be qualitatively measured and described using the thumb and thumbnail procedures indicated on Key to Soil Descriptions and Terms (provided in Attachments).

Examples of Soil Descriptions

The following are examples of soil descriptions. It is recommended that descriptive information be recorded in the order NAME, GRADATION/PLASTICITY, CONSISTENCY, MOISTURE CONTENT, COLOR, STRUCTURE, GEOLOGIC ORIGIN or NAME, UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOL.

- SAND, well graded, 5-10% sub rounded gravel to 0.5-inch max diameter., < 5% fines, medium dense, moist, yellowish brown, possible root holes (SW).
- Silty CLAY, slightly to moderately plastic, trace fine sand, stiff, wet, yellowish-green, massive, Beaufort Formation (CL).
- Clayey SAND, medium to fine, some clay, medium dense, damp, light gray (SC).
- Silty SAND, widely graded, 20-25% sub rounded gravel, 15-20% silt, 10-15% rounded boulders and cobbles, dense, saturated, olive gray, boulder till (SM).
- Gravelly SAND, poorly graded, mostly sub angular coarse sand, some sub angular gravel to 0.6-inch max diameter, < 5% fines, dense, moist, reddish brown, alluvium (SP).
- SILT, non-plastic, trace fine sand, very loose, saturated, light gray, micaceous, Lacustrine (ML).
- SAND, uniform, fine, < 5% fines, loose, dry, light brown (SP).
- Silty CLAY, slightly to moderately plastic, firm, medium gray, grades downward within varve to sandy silt, non-plastic, little fine sand, light gray, varves 0.3 - 0.4-inch-thick, varved clay (CL to ML).
- Clayey SAND, coarse to fine, mostly medium to fine, some clay, very dense, dark greenish gray, micaceous, infrequent marine shells (SC).

4.0 ATTACHMENTS

Key to Soil Descriptions and Terms

KEY TO SOIL DESCRIPTIONS AND TERMS

UNIFIED SOIL CLASSIFICATION SYSTEM					TERMS DESCRIBING SOILS (excludes particles > 3", organics, debris, etc.)		TERMS DESCRIBING MATERIALS i.e. particles > 3", organics, debris, etc.)			
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	Trace: 0 - 10%		Occasional: Particles present, but < 10%			
					Little: 10% - 25%		Some: 10% to 25%			
					Some: 25% - 45%		Frequent: >25%			
COARSE- GRAINED SOILS (>50% RETAINED on the No. 200 sieve)	GRAVELS (>50% of coarse fraction RETAINED on the No. 4 sieve)	CLEAN GRAVELS (<5% fines)	GW	Well-graded gravels or gravel-sand mixtures; trace or no fines.	TERMS DESCRIBING MOISTURE		TERMS DESCRIBING STRUCTURE			
			GP	Poorly-graded gravels or gravel-sand mixtures; trace or no fines.						
		GRAVEL WITH FINES (>12% fines)	GM	Silty gravels or gravel-sand-silt mixtures.	Dry: Absence of moisture; dusty	Layer: > 3" thick				
			GC	Clayey gravels or gravel-sand-clay mixtures.	Moist: Damp, but no visible water	Seam: 1/16" to 3" thick				
	SANDS (50% or more of coarse fraction PASSES the No. 4 sieve size)	CLEAN SANDS (<5% fines)	SW	Well-graded sands or sand-gravel mixtures; trace or no fines.	Wet: Visible/free water	Parting: < 1/16" thick				
			SP	Poorly-graded sands or sand-gravel mixtures; trace or no fines.	CORRELATION OF STANDARD PENETRATION TEST (SPT) WITH RELATIVE DENSITY AND CONSISTENCY					
		SAND WITH FINES (>12% fines)	SM	Silty sands or sand-gravel-silt mixtures.			GRAVEL, SAND & SILT (NON-PLASTIC)			
			SC	Clayey sands or sand-gravel-clay mixtures.					Relative Density	
							Very loose		0 - 4	
					Loose		5 - 10			
		Compact		11 - 30						
		Dense		31 - 50						
		Very Dense		> 50						
FINE- GRAINED SOILS (50% or more PASSES the No. 200 sieve)	SILTS AND CLAYS (liquid limit <50)		ML	Inorganic silts or rock flour, non-plastic or very slightly plastic. PI <4 or plots below "A" line.	Consistency	SPT N-Value	Su (psf)	Field Guidelines		
			CL	Inorganic lean clays. Low to medium plasticity. PI >7 and plots on or above "A" line.	Very Soft	0 - 2	0 - 250	Fist easily penetrates		
					Soft	3 - 4	250 - 500	Thumb easily penetrates		
					Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort.		
			Firm	9 - 15		1000 - 2000	Indented by thumb with great effort			
				Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail			
	Hard	>30		over 4000	Indented by thumbnail with difficulty					
	SILTS AND CLAYS (liquid limit ≥50)		MH	Inorganic elastic silt. PI line plots on or above "A" line.	ROCK QUALITY DESIGNATION (RQD)					
			CH	Inorganic fat clay. High plasticity. PI line plots on or above "A" line.						
			OH	Organic silts and clays. High plasticity.						
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils. Decomposed vegetable tissue. Fibrous to amorphous texture.	RQD = $\frac{\text{sum of the lengths of intact pieces of core} * >100\text{mm} (0.3\text{ft.})}{\text{length of core advance}}$					
			*Minimum NQ rock core (1.88 in. OD of core)							
	<u>Desired Soil Observations: (in this order)</u> Name (SAND, silty SAND, CLAY, etc., including portions - trace, little, etc) Gradation/Plasticity (well-graded, poorly graded, uniform)/(non-plastic, slightly plastic, etc.) Density/Consistency (if available from SPT blow counts, or observable for consistency) Moisture (dry, damp, moist, wet, saturated) Color (Mensell color chart if available) Structure (layering, fractures, cracks, etc.) Geologic Origin (e.g., till, lake deposit, loess) - formal name if known (e.g., Gardiners Clay) Unified Soil Classification Symbol (USCS - above) Odor, PID data, Torvane or pocket penetrometer data, etc.					Quality Description		RQD		
						Very Poor		<25%		
						Poor		26% - 50%		
Fair						51% - 75%				
Good						76% - 90%				
Excellent						>90%				
						<u>Desired Rock Observations: (in this order)</u> Color (i.e. olive brown, gray, reddish brown) Texture (aphanitic, fine-grained, etc.) Lithology (igneous, sedimentary, metamorphic, etc.) Hardness (very hard, hard, mod. hard, etc.) Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.) Geologic discontinuities/jointing: -dip (horiz - 0°-5°, low angle - 5°-35°, mod. dipping - 35°-55°, steep - 55°-85°, vertical - 85°-90°) -spacing (very close - <5 cm, close - 5-30 cm, mod.close 30-100 cm, wide - 1-3 m, very wide >3 m) -tightness (tight, open or healed) -infilling (grain size, color, etc.) Interpreted Formation (Waterville, Ellsworth, Cape Elizabeth, etc.) RQD and Rock Mass Description (very poor, poor, fair, etc.) Recovery				
<u>Example Descriptions:</u> Silty CLAY, slightly to moderately plastic, trace fine sand, stiff, wet, yellowish-green, massive, Beaufort Formation (CL). SAND, poorly graded, fine, trace silt, trace rounded gravel, loose, wet, light brown, ALLUVIUM, SP - occasional partings of fine sand; 1-inch seam of olive brown silt at 8’ bgs; Torvane = 0.55 tsf										
<u>Sample Container Labeling Requirements (if retained):</u> Site, Boring ID, Sample Number, Sample Depth, Sample Recovery, Blow Counts, Personnel Initials.										
					USCS KEY TO SOIL DESCRIPTIONS					
2 Monument Square, Suite 200, Portland, Maine										

SOP # S13

EEEG STANDARD OPERATING PROCEDURE #S13

SOIL SAMPLE COLLECTION PROCEDURE

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 29, 2025

Date

Reviewed

Date

SOIL SAMPLE COLLECTION PROCEDURE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to describe the methods used for obtaining surface and subsurface soil samples for physical, geotechnical, or chemical analysis. Collection of soil samples for laboratory analysis for volatile organic compounds may require specially prepared containers, syringes, or Encore samplers. This SOP also describes the procedures for using the various types of sampling equipment, which include shovels, trowels, and hand-augers.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

ASTM International (ASTM), 2018. Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils, Method D1586-18.

ASTM, 2017a. Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), Method D2487-17e1.

ASTM, 2017b. Standard Practice for Thick Walled, Ring-Lined, Split Barrel, Drive Sampling of Soils, Method D-3550-17.

ASTM, 2015. Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes, Method D1587-15.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043. Revised 4/16/2004.

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Techniques and Strategies. EPA-600/4-83-020.

Hewitt, Alan D., et al. 2007. Protocols for Collection of Surface Soil Samples at Military Training and Testing Ranges for the Characterization of Energetic Munitions Constituents. U.S. Army Corps of Engineers. ERDC/CRREL TR-07-10..

3.0 DEFINITIONS

Borehole - Any hole drilled or hydraulically driven into the subsurface for the purpose of identifying lithology, collecting soil samples, and/or installing monitoring wells.

Core Sampler – A metal tube (probe rod), generally 4- to 5-feet long by 2.25- to 3.25-inch OD, typically utilized along with drive rods and a PVC or acetate or equivalent liner that is used to collect soil cores utilizing a direct-push rig.

Composite Samples – Composite samples are comprised from at least two grab samples that are thoroughly mixed in a decontaminated bowl to be representative of an area, transect, or vertical section. The result typically is considered an average concentration of the depth interval sampled.

Shelby Tube Sampler – A thin-walled metal tube used to recover relatively undisturbed samples. These tubes are available in various sizes, ranging from 2 to 5 inches in outside diameter and 18 to 54 inches in length. A stationary piston device is included in the sampler to reduce sampling disturbance and increase sample recovery.

Split-Spoon Sampler – A steel tube, split in half lengthwise, with the halves held together by threaded collars at either end of the tube.

Grab Samples – A soil sample that is collected from a specific discrete interval by using such devices as stainless-steel spoon, scoop, sampling device (e.g. syringe, EnCore samplers), or sample container (e.g., wide-mouth jar).

4.0 PROCEDURES

This section contains both the responsibilities and procedures involved with soil sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

4.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and documenting them in field data records and/or the field logbook.

4.2 Preparation

Equipment Selection and Sampling Objective Considerations

Specific sampling equipment and methodology will be dictated by the characteristics of the soil to be sampled, field conditions, the type of soil samples required by the project, and the analytical procedures to be employed.

Surface Soils

Soil samples obtained from the near surface (0-2 ft bgs) may be collected using a shovel, trowel, bucket auger, or stainless-steel spoon and bowl. The type of analysis required (e.g., grain-size distribution, physical, chemical) will require specific soil amounts or the use of specialized sampling equipment. Sampling locations or sampling design will be identified in the site specific Field Activities Plan (FAP).

A hand-auger can be used to extract shallow soil samples from depths as deep as three to four feet below the surface. Representative samples are collected directly from the bucket auger after withdrawal from the ground, or in soft soils from a tube sampler attached to the end of auger rods.

Subsurface Soils

Soil samples collected from greater than 2 ft bgs, typically require specialized equipment such as a drill rig or excavator, depending on site conditions.

Equipment used to collect surface or subsurface soil samples may include, but is not limited to, the following items:

Sample devices and processing materials:

- Stainless steel spoons/trowels.
- Stainless steel hand auger.
- Stainless steel split spoon, split barrel, or continuous sampler.
- Stainless steel bowls/pans.
- Aluminum foil/pans.
- Metal/plastic scraper
- Sample jars and labels.
- Plastic sheeting.
- Appropriate decontamination equipment (e.g. stainless-steel deionized water spraying devices).
- Appropriate personnel protective equipment and safety equipment as specified in the Health and Safety Plan.

Sample handling materials:

- Sample cooler with bagged ice.
- Bubble wrap.
- Paper towels.
- Tape.
- Ziplock freezer bags

Sample description/Record keeping materials:

- Field logbook and boring log.
- Pens with waterproof ink.
- Field data records (**examples attached**)
- Chain-of-Custody forms.
- Munsell Soil Color charts.
- Grain size charts; and
- Hand lens.

4.3 Field Procedures

Decontamination

Each piece of sampling equipment shall be decontaminated before initiation of sampling operations and between each sample location and interval. Decontamination procedures will be described in the project work plan but typically consist of a wash and scrub with potable water, brushes and Alconox®/Liquinox® soap followed by a deionized water rinse. Refer to the **Field Equipment Decontamination SOP** for guidance. Spent decontamination fluids will be containerized properly, labeled, and appropriately disposed of as addressed in the FAP.

Sample Collection – Surface soils

Upon reaching the sampling location specified in the FAP. Prepare the sampling location by removing all surface materials that are not to be included in the sample (i.e., rocks, twigs, and leaves). Sod (grass and roots) should be removed using a shovel and placed to one side prior to sampling. Record pre-existing surface conditions on the Surface Soil field data record (**examples attached**).

Advance the sampler (shovel, trowel, hand auger, or tube sampler) to the required sample depth. Obtain a sufficient quantity of soil for the desired chemical or physical analyses. If volatile organic compound (VOC) or volatile petroleum hydrocarbon (GRO) samples are scheduled, they should be collected immediately based on the requirements and containers provided by the analytical laboratory. See the **Field Preservation of VOC and GRO Soil Samples SOP** for specific procedures for collection and field preservation of VOC Soil Samples. These samples should be collected directly from the sampler or from the excavated area.

The remaining soil should then be composited in a stainless-steel bowl for all other analytical parameters. Select the appropriate sample container and place the sample in the container. Describe the soil in accordance with Unified Soil Classification System (USCS) soil classification system (Refer to the **Description and Identification of Soil Samples SOP**).

Upon completion of collection of the surface soil sample, backfill the location using the excavated soils and replace sod if required.

Record all observations on the appropriate field data record (surface soil or soil boring; **example attached**) and field logbook. Mark and label sample location with flagging or a pin flag and survey the point using GPS or collect measurements from three identifiable points and record measurements and a diagram in the field logbook or field data record.

Sample Collection – Subsurface soils

Subsurface soils are typically collected during a drilling program and are collected from sample tooling as specified in the FAP. Upon reaching the required sample depth utilizing one of the drilling methods outlined in the FAP and appropriate drilling method SOP (**See SOP Table A-1 for appropriate SOP**), retrieve the sample tooling and prepare for sample collection. Alternatively samples may be collected from a test pit excavation (**Test Pit Oversight SOP**).

Complete core splitting and logging as described in the **Drilling - Soil Boring and Rock Coring Oversight SOP**. Describe the soil in accordance with USCS soil classification system (Refer to the **Description and Identification of Soil Samples SOP**).

If VOC or GRO samples are scheduled, they should be collected immediately after field screening based on the requirements and containers provided by the analytical laboratory. See the **Field Preservation of VOC and GRO Soil Samples SOP** for specific procedures for collection and field preservation of VOC Soil Samples. These samples should be collected directly from the sampler.

The remaining soil should then be composited in a stainless-steel bowl for all other analytical parameters. Select the appropriate sample container and place the sample in the container. If sufficient soil was not obtained for all analysis, additional borehole attempts at the same sample depth may be required.

Repeat this sampling procedure at the intervals specified in the project FAP until the bottom of the borehole is reached and/or last sample collected.

Record all observations on the appropriate field data record (**example attached**) and field logbook. Mark and label sample location with flagging or a pin flag and survey the point using GPS or collect measurements from three identifiable points and record measurements and a diagram in the field logbook or field data record.

Sample Handling

Upon collecting the required amount of soil, cap and label the sample container. Care should be taken to clean the sample container threads using paper towels prior to capping. The outside of the container should also be cleaned.

Clear tape should be used to wrap around the completed label to preserve legibility and prevent loss of the label during handling in wet conditions. Do not tape labels for samples collected for VOC or GRO analysis (See the **Field Preservation of VOC and GRO Soil Samples SOP**).

Place samples into a cooler with ice and begin specified storage and preservation procedures.

Samples will be labelled, handled, and transported in accordance with **Chain of Custody Procedures SOP**, the QAPP, and site-specific FAP.

5.0 ATTACHMENTS

Surface Soil Sampling Field Data Record

Soil Boring Field Data Record

Test Pit Field Data Record

SOIL BORING LOG											
EARTH ENVIRONMENT Engineering and Geology P.C. 2 Monument Square, Suite 200, Portland Maine 04101					Project Name:			Boring ID:			
					Project Location:			Page No.			
					Project No.:		Client:	of:			
Boring Location:					Refusal Depth:		Total Depth:		Bore Hole OD:		
Weather:					Soil Drilled:		Drilling Method:		Casing Size:		
Subcontractor:					Rock Drilled:		Protection Level:		Sampler:		
Driller:					Date Started:		Date Completed:		Sampler ID/OD:		
Rig Type/Model:					Logged By:		Checked By:				
Reference Elevation:					Water Level:		Time:				
Drilling Information					Sample Information			Sample Description and Classification		USCS Classification	Remarks
Depth (feet bgs)	Sample Number	Penetration (ft) / Recovery (ft)	Blow Counts	N Value	PID Field Screening (ppm)	PID Head Space Reading (ppm)	Analytical Sample Depth (ft)				
NOTES:											

EARTH
ENVIRONMENT

Engineering and Geology P.C.

2 Monument Square, Suite 200, Portland Maine 04101

Project Name:

Project Location:

Project No.:Client: NYSDEC

Test Pit ID:

Page No.1

of:1

Test Pit Location:

Weather:

Surface Conditions:

Subcontractor:

Operator:

Equipment:

Reference Elevation:

Monitoring Equipment:

Photographs (Y/N):Protection Level:

Length of Exc:Width of Exc:

Date Started:Date Completed:

Logged By:Checked By:

Refusal Depth:Total Depth:

Water Level:Time:

Location Sketch

N

Wind

Sample Information

Depth (ft. bgs)

Sample No.
& Type

Pocket Pen/
Torvane
(Kg/cm²)

PID Field Scan

PID Headspace

Lab Tests
Performed

Lab Sample ID

Monitoring

Sample Description and Classification

USCS Group Symbol

Remarks

PLAN VIEW

CROSS-SECTIONAL VIEW

LENGTH (FT.)

051015

N

Wind

DEPTH (FT.)

051015

NOTES:

DEVIATIONS:

SOP # S16

EEEG STANDARD OPERATING PROCEDURE #S16

DRILLING - SOIL BORING AND ROCK CORING OVERSIGHT

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



August 29, 2025

Chuck Staples, PG, Program Technical Lead

Date

Reviewed

Date

DRILLING - SOIL BORING AND ROCK CORING OVERSIGHT

1.0 PURPOSE

This Standard Operating Procedure (SOP) was prepared to direct field personnel in the methods for advancing soil and rock borings to characterize subsurface conditions during site hydrogeological and geotechnical investigations. The objective of soil and rock boreholes is to provide samples for description and characterization of subsurface conditions, and obtain samples for geotechnical and/or chemical analyses, often prior to installation of a monitoring well. This objective requires the use of consistent procedures for documenting observations and collecting samples.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

ASTM International (ASTM), 2018. Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils, Method D1586-18

ASTM, 2017. Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); ASTM D2487-17e1.

ASTM, 2014. Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration, Method D2113-14, ASTM International, West Conshohocken, PA.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Techniques and Strategies. EPA-600/4-83-020.

3.0 SOIL BORING METHODS

Test borings can be advanced by a variety of drilling methods. The quality of the information obtained from the various boring methods varies with the character of the subsurface geologic conditions, and careful consideration should be given in selecting the desired method. It may be necessary to employ more than one boring method to advance a particular borehole. The drilling techniques used on any particular project will be selected by the project manager and/or project geologist.

Commonly employed soil test boring techniques are described in the following subsections:

Auger Borings

This method involves advancing helical solid-flight or hollow-stemmed augers. This is a fast method for advancing the borehole, without the use of drilling fluid, and particularly effective for boring through partially saturated or unsaturated material above the groundwater table. Conventional sampling procedures are employed (e.g., split-spoon sampling). Some disturbance of the natural soil is caused by the advancing augers. Auger borings are primarily used for environmental investigations because they are cost effective and do not involve the introduction of drilling fluids and muds to the subsurface environment which may adversely impact samples for chemical analyses.

Auger borings are difficult to advance below the groundwater table in some types of granular soils because the soils can liquefy and move up inside the auger stem and/or collapse against the auger flights and cause excessive friction which may exceed the power of the drill rig to spin the augers. This condition is commonly referred to as “running sands” or “blowing sands” in the drilling industry. Running sands can be counteracted with limited success by maintaining a constant hydraulic head in hollow-stemmed augers during the sampling operations. However, the constant head technique is not very effective when drilling more than approximately ten feet below the water table in granular soils.

Hollow-stemmed augers are advanced hydraulically into the overburden to the required sampling depth. The auger acts as a casing during the advancement of the borehole. Augers are usually in five-foot sections. Some disturbances of the sampling zone may be created during the augering operation.

Soil sampling may either be conducted continuously from the ground surface or at predetermined specific depths. The site specific FAP will outline the soil sampling methodology. For discrete sample locations, a removable center plug is installed during advancement of the augers to prevent buildup of soil within the augers. This allows passage of the sampling equipment (typically a split-spoon sampler or Shelby tube) to the required depth of sample collection. A typical center plug utilized by drillers is a roller bit connected to an inner set of drilling rods.

Solid stem augers are not recommended for environmental investigations because soil samples cannot be obtained from discrete depth intervals. Soil samples from solid stem auger borings are typically collected from the surface of the auger flights as the cuttings are brought to the ground surface.

Cased Borings

This drilling method advances threaded steel casing to support the borehole as it is advanced. The casing can be driven or rotated to a given depth and soil within the casing removed using drilling fluid (e.g., water, drilling mud) or air. Split spoon samples can be retrieved from undisturbed soils below the bottom of the casing.

The borehole is advanced by constant blows of a drive hammer (typically 300 pounds, falling over a distance of 24 inches) upon a drive head, which is attached to the casing. The casing can also be spun and pushed to the desired depth. The casing is driven/spun in five-foot increments, with representative soil samples being

obtained on a continuous basis or at the completion of each five-foot drive (depending upon the project objectives outlined in the FAP).

After the casing is seated at the required depth, the borehole must be cleaned-out prior to obtaining a soil sample. The two most commonly used methods for clearing cased borings in environmental drilling are as follows are the drive and wash or rotary drilling methods.

Drive and Wash Drilling Method - Drive and wash methods are most commonly used in soils which do not contain large cobbles and boulders, or cemented horizons. The technique uses a chopping bit that is driven by a rotating drill rods to break up the material in the casing. The loosened material (cuttings) is removed from the casing by injecting drilling water or drilling mud down through the drill rods to openings in the cutting head and which then rises to the surface of the casing to settle in a wash tub adjacent to the borehole.

Rotary Technique – This method is a variation of the wash boring technique, utilizing a rotary drill bit, rather than a chopping bit. This is the method generally preferred for exploratory test borings in the geotechnical consulting industry. This method is commonly used in environmental investigations when test borings are expected to encounter dense tills and coarse granular deposits (such as gravels) or are expected to terminate at depths exceeding thirty feet below the ground surface.

The use of these materials and this method is not preferred in environmental investigations since the introduction of drilling fluids can alter the chemical composition of the groundwater adjacent to the borehole, and may have an adverse effect on groundwater quality analyses on groundwater samples from monitoring wells installed in the completed borehole. If it is necessary to use this technique to advance a borehole, the field geologist should determine the source and quality of the drilling water to be used in the boring process. The field geologist should not authorize the use of on-site or nearby groundwater or surface water bodies as the source of the drilling water, unless the proposed source has been sampled and analyzed for the full suite of contaminants considered likely to be present in the groundwater beneath the site.

In all cases where drilling water or drilling mud are used to advance a borehole, the field geologist should consider obtaining a sample of the drilling fluid for potential analysis, at the discretion of the project manager and quality assurance/quality control (QA/QC) officer.

Rotosonic Technique – This method is a variation of the rotary technique, utilizing a high frequency vibration with rotation to penetrate the overburden (and bedrock). The most common method is to advance a core barrel, which is then overridden by a larger diameter casing. This allows the retrieval of the core barrel and overburden/bedrock material, while also preventing borehole collapse (**See SOP for Sonic Drilling for more information**).

The use of this method can be particularly effective drilling through boulders, fill material, and other difficult geologic conditions, where other techniques might hit refusal, or take excessive time. This technique can often be done without the use of drilling fluids, reducing potential cross contamination and waste disposal. However, this technique can slightly disturb overburden and also heat the soil, so may not be suitable for geotechnical applications or when sampling for volatile organic compounds.

Drilling Mud - Drilling mud may be prepared from commercially available products. Employing mud in a boring makes identification of the cuttings more difficult and hinders groundwater level observations. The use of drilling mud is typically avoided when conducting environmental investigations. The use of drilling mud can reduce the permeability of the walls of the borehole, and therefore, lead to erroneous water level measurements. Additionally, the use of drilling mud introduces foreign material to the subsurface environment, which is not completely removed upon completion of the boring. The results of chemical analyses conducted on soil samples from boreholes advanced with drilling mud may not be representative of the natural (undisturbed) formation. Water samples obtained from wells installed in these boreholes may contain contaminants or parameters, which were not originally present in the groundwater prior to the use of the drilling mud.

The basic mud mixture employed in the drilling industry is bentonite and fresh water (approximately 6 percent bentonite by weight: 50 pounds of bentonite per 100 gallons of water). Attapulgite clay is commonly used and will mix with salt water to prevent flocculation. Weight additives such as pulverized barite, hematite, galena, or other heavy minerals may be added to the mixture to increase the specific gravity in troublesome soils or under artesian conditions. The precise ingredients and their proportions in the mixture must be recorded for future reference, particularly when groundwater from wells installed in their borings is to be tested for dissolved metals and pH.

Borehole Cleaning

Thorough and careful cleaning of the borehole is mandatory for obtaining representative, undisturbed soil samples. Careful measurement of tool length is required. The washing operation should not usually extend below the bottom of the casing (cohesive soils would be an exception). Special bits that deflect the wash water outward or upward should be employed, and only enough wash water should be pumped down the hole to bring the cuttings to the surface. Special shielded auger cleanouts should be employed in cohesive soils prior to obtaining undisturbed piston samples.

4.0 ROCK DRILLING METHODS

There is no universal core barrel or drilling equipment for rock coring. The geologic and topographic conditions, in addition to the requirements of the project will dictate the type of equipment to be employed on any specific project.

For environmental drilling, typically a soil boring will be completed to the top of bedrock using one of the soil boring drilling methods discussed above. Upon refusal of the soil boring at the bedrock surface a bedrock socket will be advanced 2-3 feet below the top of rock and a threaded steel casing will be inserted and grouted in place. This casing effectively seals off bedrock from the overburden soils, groundwater, and/or contamination.

There are two fundamental drilling methods for rock: non-core (destructive) or core drilling.

Non-Core (destructive) Drilling

Non-core drilling is a relatively quick and inexpensive means for advancing a rock borehole when an intact rock sample or detailed logging is not required. Non-core drilling is completed by advancing a cutting bit, rotary roller bit, or rotary drag bit to a predetermined depth with the pulverized rock cuttings removed from the borehole through the use of compressed air, drilling water, or drilling mud. Compressed air (e.g. air hammer drilling methods) is typically not used for environmental drilling as the cuttings are typically blasted to the surface away from the rig which may redistribute contamination. Sample quality considerations with regards to drilling using water or drilling mud are the same as those noted for soil borings.

Because intact rock samples are not recovered in non-core drilling, it is important for the field geologist/engineer to carefully record observations during drilling.

Rock Core Drilling

Bedrock coring for environmental drilling utilizes a rock coring barrel with a diamond or carbide tipped cutting shoe to retrieve relatively undisturbed lengths of rock cores. These core barrels come in various diameters and lengths. The required diameter of the sampler will be outlined in the FAP. NX, NQ, and HQ core sizes are most used for environmental drilling. Generally, a larger core size will produce greater recovery and less mechanical breakage.

Core barrels may consist of a single-tube, double-tube, or triple-tube configuration. Double-tube and is typical standard will provide less disturbed core samples than those from single barrel as the rock core is isolated from the drilling fluids. Triple-tube configurations will provide the least disturbed rock core samples but are less commercially available in some regions.

Core samplers are retrieved using either conventional or wireline equipment. Conventional methods require the entire drill string or rods and the core sampler need to be removed from the borehole to retrieve the rock core. Wireline methods allow for the inner tube in double and triple-tube setups to uncoupled from the outer tube and then raised rapidly to the surface using a wire line hoist. Wireline retrieval has its advantages in that it allows for improved quality of the rock core by limiting the handling of the drill string (raising through the borehole and hammer blows on the casing to separate sections or the core barrel) and allows for rapid retrieval and deployment on deeper bedrock borehole.

Alternate Rock Core Drilling

In addition to traditional rock core drilling described above, roto sonic techniques can be used to drill and core bedrock borings. The drilling technique is the same as described in the roto sonic drilling section above. This technique can be used to rapidly drill through softer or layered bedrock (such as many limestones), however is not applicable for harder rock, which this method can have difficulty penetrating. In addition, as a result of the technique, the rock can become disturbed, making it difficult to evaluate rock structure and quality, as well as natural fractures.

5.0 PROCEDURES

This section contains both the responsibilities and procedures involved with drilling oversight and sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

5.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that drilling activities are conducted in accordance with this SOP and any other appropriate procedures. This will be accomplished through staff training. The PM will select the appropriate drilling methodology based on the objectives of the project.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to drilling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead.

As with any heavy equipment, caution should be taken to minimize the potential for injuries such as crushing and pinching. Additionally, the drill rig has overhead hazards and in most cases noise hazards which should also be considered. Before any drilling is completed, the rig should be set level and the operator should inspect the location to verify that the unit is stable and secure enough to operate. All personnel shall be familiar with the location of the rig's emergency kill switch. All non-essential personnel should be kept clear of exclusion zone or from an area surrounding the rig. Due to the potential of noise, ear protection is required. If needed, hand signals should be developed for communication between engineer and the driller.

5.2 Preparation

Utility Locate

Prior to mobilizing to a site, the PM or field operations lead will ensure that the local utility "one call" service has been notified (e.g. Dig Safely New York). Typically the drilling subcontractor will be

responsnsible to call in the utlity ticket. Confirmation of the notifcation and the ticket number will be requested by the PM or field operations lead for the public records. No work may procede at the site until the ticket has been logged and all utilities have responded/marked out.

If conducting borings at an active site, the project or field engineer/geologist must contact the appropriate site personnel necessary to receive clearance to drill at specified locations. The names of the personnel authorizing clearance will be documented in the field logbook. The exact location of each boring shall also be reviewed by responsible site personnel to ensure that the area is free of the facility-owned buried utilities. Surface geophysics may be conducted to identify the locations of subsurface facility-specific structures (e.g., drain lines, septic tanks, etc..) and soft dig methods (hand clearing with shovels, post hole diggers, hand augers) may be required.

Drilling locations shall be no closer than 25 feet to overhead utilities or within 10 feet of buried utilities.

Upon arrival at the site the field operations lead will complete the Utility Clearance Form (**example attached**) to document that utility locate activities and mark out have been completed prior to the initialization of drilling activities.

Equipment Selection

The following materials will be available, as required, during drilling activities:

- Materials (e.g. drums, roll-offs, fractionation tanks) for investigation derived wastes as specified in the FAP.
- Personal protective equipment, monitoring equipment, and other health and safety equipment as specified in the project specific health and safety plan.
- Appropriate decontamination equipment (steam cleaner, materials for a decon pad, etc.) as specified in the QAPP or FAP.
- Monitoring well and other construction materials if specified in the FAP.
- Stainless steel trowels or spatulas.
- Aluminum Foil.
- Paper Towels.
- Measuring device (e.g. engineer's scale tape or rule).
- Appropriate sample containers and Field Data Records.
- Photoionization detector (PID).
- Camera.
- Field notebook.

5.3 Field Procedures

5.3.1 Documentation

In the field book, the supervising geologist/engineer shall record the name of the drilling firm and the names of the driller and his assistant(s). The date, project location, project number, and weather conditions shall be recorded as well.

An accurate time log of drilling activities shall be kept. This log shall be kept in the field logbook and shall include at a minimum, the following:

- Time driller and rig arrive on site
- Time drilling begins
- Any delays in the drilling activities and the cause of such delays
- Time drillers go off site
- Duration of decontamination and investigation derived waste handling
- Down time (those periods when drilling activities cease due to equipment malfunctions, weather, and ordered stoppages)

Monitoring equipment for field screening (PID) and community air monitoring programs (CAMP) will be calibrated daily as per manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**provided in Attachments**). Make note of calibration variances or spanning to non-standard specifications.

Soil boring information including standard penetration depth information, sampling intervals, and soil descriptions will be recorded on the Soil Boring Log field data record (**example attached**). See the **Description and Identification of Soil Samples SOP (SOP # listed on Table A-1)**.

5.3.2 Standard Penetration Tests (SPT) – Split Spoon Soil Sampling

Standard penetration tests (split spoon sampling) can be employed to collect subsurface soils samples during auger and cased-boring drilling methods. Split spoon sampling is described in ASTM Designation D 1586.

This technique should be conducted as follows (assembly, drive and retrieval of the split spoon will be completed by the driller):

1. The split-spoon sampler (spoon) consists of a 2-inch (outside diameter) by 1-3/8 inch (inside diameter) 24-inch length, heat-treated, case-hardened steel head, split-spoon, and shoe assembly. Split-spoon or split-tube samplers are the most generally accepted method for obtaining

representative soil samples however, from a geotechnical perspective, the samples obtained using a split-spoon are disturbed and unsatisfactory for some analyses. The head is vented to prevent pressure buildup during sampling and must be kept clean. A steel ball check valve is located in the head to prevent downward water pressure from displacing on the sample out the bottom of the spoon during retrieval. Failure of the check due to soil buildup in the head, frequently causes sample loss. Specialized sampling baskets can be inserted into the spoon nose to prevent sample loss in soft and cohesive soils.

2. The drive rods, which connect the spoon to the drive head, should have stiffness equal to or greater than that of the A-rod. In order to maintain only minimal rod deflection, on exceptionally deep holes, it may be preferable to use N-rods. The size of the drive rods must be kept constant throughout a specific exploration program, as the energy absorbed by the rods will vary with the size and weight of the rod employed. This is most important in geotechnical investigations.
3. The drive head consists of a drop hammer (140 pounds) with 30-inch free-fall drop free fall in order to strike the anvil attached to the top of the drill rods. Automatic trip hammers are commercially available which insure the 30-inch free-fall drop and are the preferred tools for environmental and geotechnical investigations. Automatic trip hammers are also inherently safer than older rope and cathead methods.
4. Attach the split-spoon sampler to the drill rods and lower the assembly to the bottom of the borehole. Measure the drill rod stickup to determine if heave or blow-up of the stratum has occurred. The automatic triphammer will raise the 140-pound hammer, 30 inches above the drive head anvil and then allowed to free fall and strike the anvil. This procedure is repeated until the sampler has penetrated the full length of the sampler into the stratum at the bottom of the borehole. Note any penetration of the sampler into the stratum under the weight of the rods or hammer alone.
5. The number of blows of the hammer required for each 6-inch penetration is counted and recorded on the soil boring log. When the number of blow counts exceeds 50 per 6 inches, the split spoon sampling shall be terminated and the number of blow counts per tenths of foot (for the last one-half foot) shall be recorded and noted as sampler refusal.
6. The penetration resistance (N) is determined by adding the second and third 6-inch resistance blow counts together. The blow counts will be tracked by the driller and verbally given to the field geologist/engineer after each SPT. Nomenclature for 6" penetration intervals under just the weight of the rods or hammer can use WR – weight of rods or WH – weight of hammer. When other sizes and types of sampling and drive equipment are employed, ASTM reference tables may be used in converting the obtained blow count to the accepted SPT value.

7. The sampler is then withdrawn from the borehole, preferably by using a threaded lifting plug and with the winch attached to the drill mast. Remove the sampler from the bottom of the borehole slowly to minimize disturbance. Keep the casing full of water during the removal operation.
8. Careful measurement of all drilling tools, samplers, and casing must be exercised during all phases of the test boring operations, to ensure maximum quality and recovery of the sample.
9. The split-spoon will be opened by the driller and handed to the field geologist/engineer. Upon the sampling table the spoon will be opened (split) and a fresh face will be prepared by using a clean flat edged scraper (e.g. paint scraper) in perpendicular motions to the split spoon. The resultant fresh face will be screened using a PID for volatiles and carefully examined, noting all soil characteristics, color seam, disturbance, etc. (See **Description and Identification of Soil Samples SOP [SOP # listed on Table A-1]**). For the field screening of the sample the PID inlet should be just above the soil surface and a hand should be cupped over both for an interval for a period of several seconds to get an accurate reading. This allows for the buildup of VOCs for measurement without interference from ambient air. Colder temperatures will inhibit volatilization and may require longer screening times to get accurate readings.
10. Collect photographs of the soil in the sampler. The spoon and sample should be placed in a good light, preferably against a solid colored background. A ruler for scale and a tag identifying the sample should be placed in the picture. The identifier tag must have the sample number, depth and project name or number written so as to be legible in the photograph. Any photographs taken must be recorded in the field logbook.
11. A representative sample is selected based on the sampling objectives outlined in the FAP and is collected using the appropriate sampling method and container as outlined in (**Soil Sampling and Field Preservation of VOC and GRO Samples [SOP #s listed on Table A-1]**).
12. Following the collection of representative samples for chemical and/or geotechnical analyses, remaining soil material will be collected into a separate container for VOC headspace screening (see below).
13. Steps 4 to 11 will be repeated, as necessary, until the bottom of the borehole, as outlined in the FAP, is reached (e.g. refusal or a predetermined depth). Frequency of sample collection will either be continuous or at predetermined depths. The casing or augers will be advanced through each interval once SPT has been completed.
14. After the terminal depth of the borehole has been achieved, and an environmental monitoring well will not be installed, the borehole should be backfilled with a cement/bentonite grout. Grout will be injected using a small diameter pipe to the base of the borehole. Drilling fluids within the borehole will be displaced upwards, collected in the drilling wash tub, and will be containerized

as investigation derived waste. Alternatively, grout may be injected using the drill string in the same manner as the drilling fluids. Care should be taken to ensure the grout does not bridge forming gaps or voids in the grout column. Casing and augers will be slowly retracted during borehole abandonment to prevent the bottom of the casing/auger from rising above the top of the grout column. Grout will be mixed and injected in multiple lifts until flush with the ground surface. Following grouting, barriers should be placed over grouted boreholes as the grout is likely to settle in time, creating a physical hazard. Grouted boreholes will typically require at least a second visit to “top off” the hole.

12. If a monitoring well is to be installed see the **Monitoring Well and Microwell Installation SOP** for methodology and installation details.
13. Decontaminate non-disposable equipment or tools that may have come into contact with subsurface soil in accordance with the FAP.
14. Discard all disposable equipment used during sampling activities in a designated location.
15. The approximate location of the boring will be marked with a wood stake colored with highly visible spray paint and/or flagging. The boring number will also be written on the stake to identify the sample location for surveying purposes.

Records of each exploration shall be made on a Soil Boring Log and in the field logbook. All cuttings or other waste will be containerized or disposed of in accordance with planning documents.

5.3.3 Soil Headspace Screening

The purpose of the soil headspace screening procedure is to screen soil sample headspaces for total ionizing VOCs. This is a semi-quantitative method used to identify the presences, absence, and relative concentrations of VOCs in soil. Headspace screening is performed with a photoionization detector (PID). Headspace readings may be completed in between sample runs. Headspace readings should be transcribed on to the soil boring log field data record.

1. Record and document background VOC readings in ambient air. If it is not feasible to screen samples in an area with a clean background, document the highest background reading.
2. Half fill a clean jar or Ziplock™ type plastic bag with soil. Quickly cover the jar with aluminum foil or close the plastic bag and label the container.
3. Vigorously shake the sample to disperse soil and wait for approximately 5 minutes. Record the ambient temperature at which screening is performed. If outside temperatures are below 50°F, try to warm the samples in a heated vehicle or building.
4. Shake the sample again after 5 minutes.
5. Insert the tip of the PID through the foil or into the plastic bag and record the highest meter

response, typically after approximately 3 to 15 seconds.

6. After screening all samples, re-check background and record significant variations.

The PID has a reliable reporting limit of 1 part per million in air. Readings at or below the reporting limit should be reported as not-detected “ND”.

Screening results will vary based on sample temperature, compounds present, age of the sample, and the degree to which the sample has been agitated and crumbled. Field personnel should remain consistent in their headspace measurement methodology to avoid biasing samples.

5.3.4 Rock Coring

There is no universal core barrel or drilling equipment for rock coring. The geologic and topographic conditions, in addition to the requirements of the project will dictate the type of equipment to be employed on any specific project. Specific methods, equipment, and core sizes will be specified in the FAP.

Non-Core Procedures

The following general procedures will apply to non-coring drilling methods:

1. Upon encountering boring refusal at the soil/bedrock interface, a rock socket will be advanced 2 to 3 feet below the top of rock and a threaded steel casing should be firmly seated and grouted in place. The casing should be allowed to sit for 24-hours to allow the grout to cure.
2. After the grout has cured, a selected cutting bit will be advanced down the casing to the terminal drilling depth. Drilling water will be recirculated through the borehole to bring fines to the surface and be contained in a settling basin/wash tub.
3. Pump drill water down the drill rods and observe a return flow before commencing drilling operations.
4. Carefully measure all length of rods, core barrel, and stick-up through all phases of the drilling to insure accurate depth determination.
5. During the drilling a strainer will be used to catch rock chips being carried by the drilling water. Basic descriptions of these rock chips will be recorded on the FDR.
6. Other descriptions that should be included on the FDR include:
 - a. Penetration rate (feet per minute)
 - b. Sudden dropping of the rods (voids or large fractures)
 - c. Unusual drill action (bouncing, chatter, binding)
 - d. Loss of drilling fluid or color change of the fluid

Rock Core Procedures

The following general procedures are applicable to rock coring drilling methods:

1. Upon encountering boring refusal at the soil/bedrock interface, a rock socket will be advanced 2 to 3 feet below the top of rock and a threaded steel casing should be firmly seated and grouted in place. The casing should be allowed to sit for 24-hours to allow the grout to cure.
2. After the grout has cured, a roller tri-cone bit will be advanced down the casing to remove any grout inside the casing and create a fresh surface for coring. Drilling water will be recirculated through the borehole to bring fines to the surface and be contained in a settling basin/wash tub.
3. Mount the core barrel on the drilling rods and lower it into the borehole until the bit touches the bedrock surface.
4. Pump drill water down the drill rods and observe a return flow before commencing drilling operations.
5. Carefully measure all length of rods, core barrel, and stick-up through all phases of the drilling to insure accurate depth determination.
6. The diamond-bit core barrel should be started in the hole and the rock drilled in continuous 5-foot length intervals (runs) until the required depth is reached. Runs longer than 5-ft should be avoided as it will reduce core recovery and poor quality in fractured and weathered rock.
7. Drill with minimal vertical pressure and rotation. Most rigs are equipped with a selection of gear ratios and a variable hydraulically controlled feed mechanism. Driller expertise in selecting the correct combination of speed and feed rate is invaluable. Faster rotation and high down pressures can mechanically fracture the rock, reducing the quality of the retrieved rock core.
8. Water return should be no more than what is just sufficient to bring the borehole cuttings to the surface.
9. Record the start and stop time for each run and factor out stoppages due to drill rod additions to complete a run. These times should be recorded in the field book and a penetration rate of ft/min should be recorded on the field data record.
10. Upon completing each 5-foot core run, the core barrel is spun and lifted to break the core at the bottom of the run. After the core is broken off it should be withdrawn, labeled, and stored in an approved core box.
11. Cores should be carefully handled to ensure their proper identification and placement in correct order. Carefully place the rock core in the core box with wooden partitions so that the cores from each run will be kept separate. The core should always be placed in the core box

- in book fashion with the top of the run at the upper left corner and the remaining core placed sequentially from left to right and from the top left corner to the lower right corner. Place a wooden partition labelled with the start and end depths at the beginning and end of each core run. The core should fit snugly in the box so that it will not roll or slide and suffer additional breakage.
12. Each core box should only contain cores from a single boring. Never place the core from more than one test boring in a core box. In addition, wherever core is lost due to the presence of a cavity or large discontinuity (open or filled), a spacer should be placed in the proper position in the core box. The spacer should be labeled with the depth range and thickness of the missing core, and the reason for the missing core (e.g., cavity, large joint, etc.).
 13. A straight line should be drawn down the length of the core with character markers (e.g. arrows) on fractures to preserve original orientations if the rock core becomes disturbed. Masonry chalk markers are suitable marking tools. If a core is required to be broken in order to fit in the core box, notes of the break depth should be reported on the field data record and in the field book. This break will not be factored into rock quality designation calculations.
 14. Carefully examine and classify the rock and measure the recovery and rock quality designation in percent (See **Description and Identification of Rock Samples** for guidance). Record all information on the field data record (**example Attached**).
 15. If 100% recovery was not obtained, sound the borehole to determine if the missing core still remains in the bottom of the borehole. Always terminate each boring with 100% recovery, in order to ensure that appropriate knowledge is available of their materials.
 16. The core box should be marked on the top and two ends with the client's name, site identification, boring number, depth range, and box number. The inner core box lid should include the run number, depth range, recovery, and rock quality designation.
 17. The core barrel and drilling tools must be steam-cleaned or washed upon completion of the bore hole to preclude cross contamination between successive bore holes.

The following information shall be included in a rock core run log:

- The depth and length of the core run.
- The coring rates.
- The color of the core wash water. Any changes, loss of return water, or gain of return water will be noted.

- The recovery of the core run recorded as length of rock recovered over the length of the core run.
- The RQD of the run is reported as the sum of inches of all naturally fractured rock core pieces larger than four inches over the total number of inches in the run. The length of the piece will be determined by the distance between naturally occurring fractures.
- The rock type(s) and their location in the core run, rotating color, mineralogy, texture, fossil content, effervescence in HCL, and any other data of geologic significance.
- Any structure in the core, including fractures, clay seams, vugs, bedding, fissility, and any other data of geologic or geotechnical significance.

Rock core samples are photographed in the wooden core box. The rock should be wetted to enhance the color and textural changes in the rock. Due to the relatively large size of most core boxes, the photographer (when possible) should stand up on a chair, tail gate, car bumper or other perch in order to photograph the box from directly above, and get the entire box in the camera's field of view. The photograph must include a ruler for scale and an identifier tag indicating the project name and number, the boring number, the date, and the depths of the various core runs.

5.3.5 Monitoring Well Installation

Bedrock boreholes may either be left open or have discrete monitoring wells installed for groundwater sampling. Well completion details will be outlined in the FAP. Further guidance is available in the **SOP for Monitoring Well and Microwell Installation**.

6.0 ATTACHMENTS

Utility Clearance Form

Soil Boring Log

Rock Coring Log

Field Instrument Calibration Record

Utility Clearance Form

Site Name: _____
 Site Address: _____
 Project Manager Name: _____
 Locations cleared by facility? _____

Project No./Task No.: _____
 One Call Ticket No.: _____
 Ticket Good until: _____
 PM Phone No.: _____
 Date Cleared: _____

Utility Clearance:

Potential Utilities		Identified		Colors	Utility Company Name(s)	Utilities
Member of One Call	*Non Members	Utility Marked	Utility Responded not Present			
						WHITE - Proposed Excavation
						**PINK - Temporary Survey Markings
						RED - Electric Power Lines, Cables, Conduit and Lighting Cables
						YELLOW - Gas, Oil, Steam, Petroleum or Gaseous Materials
						ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit
						BLUE - Potable Water
						PURPLE - Reclaimed Water, Irrigation and Slurry Lines
						GREEN - Sewers and Drain Lines

*Contact local municipality

** Survey markings need to be protected. If disturbed or destroyed, replace markings.

Private Utility Locator/Geophysical Survey

Method to be used: _____ Pipe and Cable Location
 _____ Ground Penetrating Radar
 _____ Magnetics and Electromagnetics

Non-Destructive Excavation Method to be used

_____ *Hand Dig
 _____ Soil Vacuum
 _____ Air Knife
 _____ Water Knife
 * Use electrically insulated gloves if potential for power lines

Field Clues Observed/Evaluated:

_____ Overhead power lines	_____ Patches in concrete floors	_____ Guard shack – service utilities
_____ Cell phone/radio antennas	_____ Drainage ditches in area	_____ Bathroom and kitchen facilities
_____ Trench patches	_____ Utility vaults	_____ Radiant heat systems in slabs (ask)
_____ Trench settlement	_____ Transformer pads	_____ Cooling units outside building
_____ Trench drains	_____ Conduits from power panels into slab	_____ Process water to equipment in factory
_____ Utility manholes	_____ Above ground propane tanks	_____ Sprinkler system landscaping
_____ Manholes just outside building	_____ Fire protection rooms	_____ Grounding systems near perimeter
_____ Valve risers	_____ Fire protection lines	_____ Water tower on site.
_____ Floor cleanout covers	_____ Fire hydrant locations – valves in ground	_____ Foundation drains - building perimeter
_____ Floor drains	_____ Footings under structural columns	

Additional Notes/Remarks:

Confidence Level that All Utilities have been identified:

_____ High _____ Medium High _____ *Moderate _____ *Medium Low _____ *Low

*Contact PM. Get PM and OM permission prior to proceeding

*Discussed with
 OM? _____

*Cleared by PM? _____

SOIL BORING LOG											
EARTH ENVIRONMENT Engineering and Geology P.C. 2 Monument Square, Suite 200, Portland Maine 04101					Project Name:			Boring ID:			
					Project Location:			Page No.			
					Project No.:		Client:	of:			
Boring Location:					Refusal Depth:		Total Depth:		Bore Hole OD:		
Weather:					Soil Drilled:		Drilling Method:		Casing Size:		
Subcontractor:					Rock Drilled:		Protection Level:		Sampler:		
Driller:					Date Started:		Date Completed:		Sampler ID/OD:		
Rig Type/Model:					Logged By:		Checked By:				
Reference Elevation:					Water Level:		Time:				
Drilling Information					Sample Information			Sample Description and Classification		USCS Classification	Remarks
Depth (feet bgs)	Sample Number	Penetration (ft) / Recovery (ft)	Blow Counts	N Value	PID Field Screening (ppm)	PID Head Space Reading (ppm)	Analytical Sample Depth (ft)				
NOTES:											

ROCK CORING LOG													
EARTH ENVIRONMENT Engineering and Geology P.C. 2 Monument Square, Suite 200, Portland Maine 04101				Project Name:				Boring ID:					
				Project Location:				Page No.					
				Project No.:		Client:		of:					
Boring Location:				Top of Rock:		Total Depth:		Casing Type:					
Weather:				Casing Depth:		Drilling Method:		Casing Size:					
Subcontractor:				Rock Drilled:		Protection Level:							
Driller:				Date Started:		Date Completed:		Core Barrel Type:					
Rig Type/Model:				Logged By:		Checked By:		Core Size:					
Reference Elevation:				Water Level:		Time:		Core Length:					
Drilling Information				Sample Quality				Sample Description and Classification				Lithologic Type	Remarks
Depth (feet bgs)	Run Number	Run Length (ft) / Recovery (ft)	Penetration Rate (ft/min)	RQD (%)	Fracture Depth (feet)	Fracture Type	Fracture Angle						
NOTES:													

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT LOCATION: _____

WEATHER CONDITIONS (AM): _____

WEATHER CONDITIONS (PM): _____

TASK NO: _____

DATE: _____

MACTEC CREW: _____

SAMPLER NAME: _____

SAMPLER SIGNATURE: _____

CHECKED BY: _____

DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

AM CALIBRATION

Start Time _____/End Time _____

Units

Standard Value

Meter Value

*Acceptance Criteria (AM)

pH (4) SU4.0_____/+/- 0.1 pH Units

pH (7) SU7.0_____/+/- 0.1 pH Units

pH (10) SU10.0_____/+/- 0.1 pH Units

Redox +/- mV240_____/+/- 10 mV

Conductivity mS/cm1.413_____/+/- 0.5 % of standard

DO (saturated) %100_____/+/- 2% of standard

DO (saturated) mg/L¹ (see Chart 1)_____/+/- 0.2 mg/L

DO (<0.1) mg/L<0.1_____/< 0.5 mg/L

Temperature °C_____/

Baro. Press. mmHg_____/

POST CALIBRATION CHECK

Start Time _____/End Time _____

Standard Value

Meter Value

*Acceptance Criteria (PM)

7.0_____/+/- 0.3 pH Units

240_____/+/- 10 mV

1.413_____/+/- 5% of standard

_____/+/- 0.5 mg/L of standard

_____/

_____/

TURBIDITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Units

Standard Value

Meter Value

Standard Value

Meter Value

*Acceptance Criteria (PM)

<0.1 Standard NTU<0.1_____/+/- 0.3 NTU of stan.

20 Standard NTU20_____/+/- 5% of standard

100 Standard NTU100_____/+/- 5% of standard

800 Standard NTU800_____/+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Background ppmv<0.1_____/within 5 ppmv of BG

Span Gas ppmv100_____/+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Methane %50_____/+/- 10% of standard

O₂ %20.9_____/+/- 10% of standard

H₂S ppmv25_____/+/- 10% of standard

CO ppmv50_____/+/- 10% of standard

OTHER METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

See Notes Below for Additional Information

☐

Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☐

Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: _____

Lot#/Date Produced: _____

Trip Blank Source: _____

Sample Preservatives Source: _____

Disposable Filter Type: _____

Calibration Fluids / Standard Source: _____

- DO Calibration Fluid (<0.1 mg/L) _____

- Other _____

- Other _____

- Other _____

Cal. Standard Lot Number

Exp. Date

pH (4) _____

pH (7) _____

pH (10) _____

ORP _____

Conductivity _____

<0.1 Turb. Stan. _____

20 Turb. Stan. _____

100 Turb. Stan. _____

800 Turb. Stan. _____

PID Span Gas _____

O₂-LEL Span Gas _____

Other _____

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

EARTH ENVIRONMENT

Engineering and Geology P.C.

2 Monument Square, Suite 200, Portland Maine 04101

FIELD INSTRUMENT CALIBRATION RECORD

A4_Field_Instrument_Calibration_Record

8/29/2025

SOP # S17

EEEG STANDARD OPERATING PROCEDURE #S17

DIRECT PUSH SAMPLING

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Charles Staples, PG, Program Technical Lead

August 29, 2025

Date

Reviewed

Date

DIRECT PUSH SAMPLING

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes methodologies using a direct-push sampling system (e.g. GeoProbe®) that may be used to conduct soil, groundwater, or soil vapor sampling surveys. This technology can be used to collect samples for off-site laboratory analysis or provide screening information that can be used to optimize the future location of soil borings and monitoring well installations and to assess contamination in the vadose zone and saturated overburden.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

ASTM International (ASTM), 2017. Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); ASTM D2487-17e1.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Techniques and Strategies. EPA-600/4-83-020.

3.0 DRILLING METHODOLOGY

The direct push drilling technique consists of a hydraulic ram unit, usually mounted on a vehicle (ATV, cargo van, or pick-up truck) or drill rig that advances small diameter drill rods to obtain overburden soil, install piezometers and temporary wells for groundwater sampling, and install sample points for vapor samples. Advantages utilizing the method over traditional test boring drilling methods for environmental investigations include low cost, increased maneuverability and access to irregular terrain, and minimization of investigation derived wastes. Disadvantages include depth limitations and small sample volumes for chemical analyses.

The direct push device may employ either dual tube methodology which allows the collection of subsurface soil samples through an outer casing that is set to maintain the integrity of the boring or single-rod method that collects soil into a sleeve liner within the lead rod.

In the dual-tube method borings are advanced by simultaneously driving an outer stainless-steel casing and inner polycarbonate (Lexan®) or acetate tube into the ground. Upon reaching the desired penetration depth, the inner sample tube is withdrawn to collect the discrete subsurface soil samples, leaving the outer casing in place. To sample the next interval of soil, a new length of Lexan® tubing is then inserted into the outer casing (already in the ground) attached to a length of drive pipe, and another length of outer casing is attached to the top of the outer casing that is already in the ground.

In the single-rod method, 3/4-inch diameter rods are advanced in 4 to 5-ft sections depending on the length of the sampler. The lead section is fitted with an inner acetate sleeve. When the top of the desired sampling interval is reached, a tool is used to unlock the drive point and the rod is driven ahead to obtain the soil sample. The entire drill rod is retrieved, and the liner removed for characterization. The process is then repeated to collect the next desired sample. This process may be modified to collect groundwater samples or soil gas samples. Procedures for collecting groundwater or vapor samples will be outlined in the FAP, if required.

4.0 PROCEDURES

This section contains both the responsibilities and procedures involved with direct push sampling oversight and sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

4.1 RESPONSIBILITIES

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures. This will be accomplished through staff training. The PM will select the appropriate sampling methodology and analytical program based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead.

4.2 Preparation

Utility Locate

Prior to mobilizing to a site, the PM or field operations lead will ensure that the local utility “one call” service has been notified (e.g. Dig Safely New York). Typically the drilling subcontractor will be responsible to call in the utility ticket. Confirmation of the notification and the ticket number will be requested by the PM or field operations lead for the public records. No work may proceed at the site until the ticket has been logged and all utilities have responded/marked out.

If conducting borings at an active site, the project or field engineer/geologist must contact the appropriate site personnel necessary to receive clearance to drill at specified locations. The names of the personnel authorizing clearance will be documented in the field logbook. The exact location of each boring shall also be reviewed by responsible site personnel to ensure that the area is free of the facility-owned buried utilities. Surface geophysics may be conducted to identify the locations of subsurface facility-specific structures (e.g., drain lines, septic tanks, etc..) and soft dig methods (hand clearing with shovels, post hole diggers, hand augers) may be required.

Direct push locations shall be no closer than 25 feet to overhead utilities or within 5 feet of buried utilities. Direct push methodology allows for small diameter borings that minimize ground disturbance. If project requirements dictate use in proximity to utilities, borings may be advanced if the proper health and safety considerations are applied (e.g. pre-clearing)

Upon arrival at the site the field operations lead will complete the Utility Clearance Form (**example attached**) to document that utility locate activities and mark out have been completed prior to the initialization of drilling activities.

Equipment Selection and Sampling Considerations

The following materials will be available, as required, during the subsurface soil sampling:

- Personal protective equipment, monitoring equipment, and other health and safety equipment as specified in the project specific health and safety plan.
- decontamination equipment as specified in the QAPP.
- Stainless steel trowels or spatulas.
- Aluminum Foil.
- Paper Towels.
- Measuring device (e.g. engineer's scale tape or rule).
- Appropriate sample containers and Field Data Records.
- Photoionization detector (PID).
- Camera
- Field knife with hook blades (if liner sleeves are used to collect the soil samples).
- Field notebook.
- Appropriate decontamination equipment (steam cleaner, materials for a decon pad, etc.) as necessary.
- Drums for investigation derived waste containment as specified in the work plans.
- Piezometer construction materials if specified in the FAP.

4.3 Field Procedures

Documentation

In the field book, the supervising geologist/engineer shall record the name of the drilling firm and the names of the driller and his assistant(s). The date, project location, project number, and weather conditions shall be recorded as well.

An accurate time log of drilling activities shall be kept. This log shall be kept in the field logbook and shall include at a minimum, the following:

- Time driller and rig arrive on site
- Time drilling begins
- Any delays in the drilling activities and the cause of such delays
- Time drillers go off site
- Duration of decontamination and investigation derived waste handling
- Down time (those periods when drilling activities cease due to equipment malfunctions, weather, and ordered stoppages)

Monitoring equipment for field screening (PID) and community air monitoring programs will be calibrated daily as per manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**example attached**). Make note of calibration variances or spanning to non-standard specifications.

Soil boring information including standard penetration depth information, sampling intervals, and soil descriptions will be recorded on the Soil Boring Log field data records (**example attached**). See the **Description and Identification of Soil Samples SOP (see Table A-1 for SOP #)** for soil identification and description methodology.

Field Methodology

The direct-push explorations shall be completed by a qualified direct-push subcontractor, and directed by a qualified field person.

The following procedures will be employed to collect subsurface soil samples. Assembly, advancement, retrieval and opening of the sampler will be completed by the driller.

1. Identify sample locations from the FAP and note the locations in field notebook by measuring 3-point ties to physical features.
2. Drilling contractor will set up an equipment decontamination area and decontaminate equipment as described in the FAP and in accordance with the **Equipment Decontamination SOP S20 (see Table A-1 for SOP #)**. Use new, clean materials for when decontamination is not appropriate

(e.g., disposable gloves and dedicated drive points). Document the decontamination procedure in the field notebook.

3. The driller will assemble the appropriate direct-push sampling apparatus or other direct push tool. Soil samples will be collected using a four to five-foot long 1-to-2-inch diameter core sampler. The FAP will determine if a dual tube split-spoon system or a single rod acrylic liner method will be used for the collection of subsurface soil samples.
4. The driller will drive the sampling tools to the appropriate sampling zone and collect a sample. Retrieve the sampler using an appropriate lifting apparatus (winch or lift hook). Remove the sampler shoe and retrieve the sample in the sample liner.
5. Upon the sampling table the liner will be opened by cutting lengthwise using a hook bladed utility knife or similar cutting implement. Once opened the field staff will prepare a fresh face by using a clean flat edged scraper (e.g. paint scraper) in perpendicular motions to the liner. The resultant fresh face will be screened using a PID for volatiles and carefully examined, noting all soil characteristics, color seam, disturbance, etc. (see the **Description and Identification of Soil Samples SOP identified on Table A-1**). For the field screening of the sample the PID inlet should be just above the soil surface and a hand should be cupped over both for an interval for a period of several seconds to get an accurate reading. This allows for the buildup of VOCs for measurement without interference from ambient air. Colder temperatures will inhibit volatilization and may require longer screening times to get accurate readings.
6. Field staff will take photographs of the soil in the sampler. The sampler should be placed in a good light, preferably against a solid colored background. A ruler for scale and a tag identifying the sample should be placed in the picture. The identifier tag must have the sample number, depth and project name or number written so as to be legible in the photograph. Any photographs taken must be recorded on the field data record.
7. Field staff will collect a representative sample, selected based on the sampling objectives outlined in the FAP and is collected using the appropriate sampling method and container as outlined in **SOPs for Soil Sampling and Field Preservation of VOC and GRO Soil Samples (see Table A-1 for SOP #s)**.
8. Following the collection of representative samples for chemical and/or geotechnical analyses, remaining soil material will be collected into a separate container for VOC headspace screening (see below).
9. Steps 4 to 8 will be repeated, as necessary, until the bottom of the borehole, as outlined in the FAP, is reached (e.g. refusal or a predetermined depth). Frequency of sample collection will either be continuous or at predetermined depths.

10. If a temporary well or piezometer is to be installed see **the Monitoring Well and Microwell Installation SOP (see Table A-1 for SOP#)** for methodology and installation details.
11. The approximate location of the boring will be marked with a wood stake colored with highly visible spray paint and/or flagging. The boring number will also be written on the stake to identify the sample location for surveying purposes.
12. Decontaminate non-disposable equipment or tools that may have come into contact with subsurface soil in accordance with the FAP.
13. Discard all disposable equipment used during sampling activities in a designated location.

Records of each exploration shall be made on a Soil Boring Log (**example attached**) and in the field logbook. All cuttings or other waste will be containerized or disposed of in accordance with planning documents.

Abandonment of Boreholes

After drilling, logging and/or sampling, boreholes should be backfilled by the method required by the applicable agency and described in the project FAP. This typically consists of backfilling to the surface with bentonite chips, pellets or bentonite-cement grout. If bentonite chips or pellets are used, they should be added to the borehole in two-foot lifts and hydrated with water from a potable water supply. This process should be repeated until the entire borehole is plugged using no less than five gallons' water per ten feet of borehole. The surface hole condition should match the pre-drilling condition (asphalt, concrete, or smoothed flush with native surface), unless otherwise specified in the FAP.

Soil Headspace Screening

The purpose of the soil headspace screening procedure is to screen soil sample headspaces for total ionizing VOCs. This is a semi-quantitative method used to identify the presences, absence, and relative concentrations of VOCs in soil. Headspace screening is performed with a photoionization detector (PID). Headspace readings may be completed in between sample runs. Headspace readings should be transcribed on to the soil boring log field data record.

1. Record and document background VOC readings in ambient air. If it is not feasible to screen samples in an area with a clean background, document the highest background reading.
2. Half fill a clean jar or Ziplock™ type plastic bag with soil. Quickly cover the jar with aluminum foil or close the plastic bag and label the container.
3. Vigorously shake the sample to disperse soil and wait for approximately 5 minutes. Record the ambient temperature at which screening is performed. If outside temperatures are below 50°F, try to warm the samples in a heated vehicle or building.
4. Shake the sample again after 5 minutes.

5. Insert the tip of the PID through the foil or into the plastic bag and record the highest meter response, typically after approximately 3 to 15 seconds.
6. After screening all samples, re-check background and record significant variations.

The PID has a reliable reporting limit of 1 part per million in air. Readings at or below the reporting limit should be reported as not-detected “ND”.

Screening results will vary based on sample temperature, compounds present, age of the sample, and the degree to which the sample has been agitated and crumbled. Field personnel should remain consistent in their headspace measurement methodology to avoid biasing samples.

5.0 ATTACHMENTS

Utility Clearance Form

Soil Boring Log

Field Instrument Calibration Record

Utility Clearance Form

Site Name: _____
 Site Address: _____
 Project Manager Name: _____
 Locations cleared by facility? _____

Project No./Task No.: _____
 One Call Ticket No.: _____
 Ticket Good until: _____
 PM Phone No.: _____
 Date Cleared: _____

Utility Clearance:

Potential Utilities		Identified		Colors	Utility Company Name(s)	Utilities
Member of One Call	*Non Members	Utility Marked	Utility Responded not Present			
						WHITE - Proposed Excavation
						**PINK - Temporary Survey Markings
						RED - Electric Power Lines, Cables, Conduit and Lighting Cables
						YELLOW - Gas, Oil, Steam, Petroleum or Gaseous Materials
						ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit
						BLUE - Potable Water
						PURPLE - Reclaimed Water, Irrigation and Slurry Lines
						GREEN - Sewers and Drain Lines

*Contact local municipality

** Survey markings need to be protected. If disturbed or destroyed, replace markings.

Private Utility Locator/Geophysical Survey

Method to be used: _____ Pipe and Cable Location
 _____ Ground Penetrating Radar
 _____ Magnetics and Electromagnetics

Non-Destructive Excavation Method to be used

_____ *Hand Dig
 _____ Soil Vacuum
 _____ Air Knife
 _____ Water Knife
 * Use electrically insulated gloves if potential for power lines

Field Clues Observed/Evaluated:

_____ Overhead power lines	_____ Patches in concrete floors	_____ Guard shack – service utilities
_____ Cell phone/radio antennas	_____ Drainage ditches in area	_____ Bathroom and kitchen facilities
_____ Trench patches	_____ Utility vaults	_____ Radiant heat systems in slabs (ask)
_____ Trench settlement	_____ Transformer pads	_____ Cooling units outside building
_____ Trench drains	_____ Conduits from power panels into slab	_____ Process water to equipment in factory
_____ Utility manholes	_____ Above ground propane tanks	_____ Sprinkler system landscaping
_____ Manholes just outside building	_____ Fire protection rooms	_____ Grounding systems near perimeter
_____ Valve risers	_____ Fire protection lines	_____ Water tower on site.
_____ Floor cleanout covers	_____ Fire hydrant locations – valves in ground	_____ Foundation drains - building perimeter
_____ Floor drains	_____ Footings under structural columns	

Additional Notes/Remarks:

Confidence Level that All Utilities have been identified:

_____ High _____ Medium High _____ *Moderate _____ *Medium Low _____ *Low

*Contact PM. Get PM and OM permission prior to proceeding

*Discussed with
 OM? _____

*Cleared by PM? _____

SOIL BORING LOG											
EARTH ENVIRONMENT Engineering and Geology P.C. 2 Monument Square, Suite 200, Portland Maine 04101					Project Name:			Boring ID:			
					Project Location:			Page No.			
					Project No.:		Client:	of:			
Boring Location:					Refusal Depth:		Total Depth:		Bore Hole OD:		
Weather:					Soil Drilled:		Drilling Method:		Casing Size:		
Subcontractor:					Rock Drilled:		Protection Level:		Sampler:		
Driller:					Date Started:		Date Completed:		Sampler ID/OD:		
Rig Type/Model:					Logged By:		Checked By:				
Reference Elevation:					Water Level:		Time:				
Drilling Information					Sample Information			Sample Description and Classification		USCS Classification	Remarks
Depth (feet bgs)	Sample Number	Penetration (ft) / Recovery (ft)	Blow Counts	N Value	PID Field Screening (ppm)	PID Head Space Reading (ppm)	Analytical Sample Depth (ft)				
NOTES:											

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT LOCATION: _____

WEATHER CONDITIONS (AM): _____

WEATHER CONDITIONS (PM): _____

TASK NO: _____

DATE: _____

MACTEC CREW: _____

SAMPLER NAME: _____

SAMPLER SIGNATURE: _____

CHECKED BY: _____

DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

AM CALIBRATION

Start Time _____/End Time _____

Units

Standard Value

Meter Value

*Acceptance Criteria (AM)

pH (4)

SU

4.0

+/- 0.1 pH Units

pH (7)

SU

7.0

+/- 0.1 pH Units

pH (10)

SU

10.0

+/- 0.1 pH Units

Redox

+/- mV

240

+/- 10 mV

Conductivity

mS/cm

1.413

+/- 0.5 % of standard

DO (saturated)

%

100

+/- 2% of standard

DO (saturated)

mg/L¹ (see Chart 1)

+/- 0.2 mg/L

DO (<0.1)

mg/L

<0.1

< 0.5 mg/L

Temperature

°C

Baro. Press.

mmHg

POST CALIBRATION CHECK

Start Time _____/End Time _____

Standard Value

Meter Value

*Acceptance Criteria (PM)

7.0

+/- 0.3 pH Units

240

+/- 10 mV

1.413

+/- 5% of standard

+/- 0.5 mg/L of standard

TURBIDITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Units

Standard Value

Meter Value

<0.1 Standard

NTU

<0.1

20 Standard

NTU

20

100 Standard

NTU

100

800 Standard

NTU

800

Standard Value

Meter Value

*Acceptance Criteria (PM)

<0.1

+/- 0.3 NTU of stan.

20

+/- 5% of standard

100

+/- 5% of standard

800

+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Background

ppmv

<0.1

Span Gas

ppmv

100

<0.1

within 5 ppmv of BG

100

+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Methane

%

50

O₂

%

20.9

H₂S

ppmv

25

CO

ppmv

50

50

+/- 10% of standard

20.9

+/- 10% of standard

25

+/- 10% of standard

50

+/- 10% of standard

OTHER METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

See Notes Below
for Additional
Information

☐

Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☐

Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: _____

Lot#/Date Produced: _____

Trip Blank Source: _____

Sample Preservatives Source: _____

Disposable Filter Type: _____

Calibration Fluids / Standard Source: _____

- DO Calibration Fluid (<0.1 mg/L)

- Other

- Other

- Other

Portland FOS

Laboratory provided

Laboratory provided

in-line 0.45µm cellulose

Portland FOS

Cal. Standard Lot Number

Exp. Date

pH (4)

pH (7)

pH (10)

ORP

Conductivity

<0.1 Turb. Stan.

20 Turb. Stan.

100 Turb. Stan.

800 Turb. Stan.

PID Span Gas

O₂-LEL Span Gas

Other

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

EARTH
ENVIRONMENT

Engineering and Geology P.C.

2 Monument Square, Suite 200, Portland Maine 04101

FIELD INSTRUMENT CALIBRATION RECORD

SOP # S18

EEEG STANDARD OPERATING PROCEDURE #S18

SONIC DRILLING OVERSIGHT

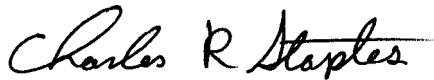
August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Chuck Staples, PG, Program Technical Lead

August 29, 2025

Date

Reviewed

Date

SONIC DRILLING OVERSIGHT PROCEDURE

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes methodologies for sonic drilling. This procedure includes the minimum required steps and quality checks that employees and subcontractors are to follow when drilling using this technique. This SOP addresses technical requirements and required documentation to be completed during sonic drilling oversight.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

Boart Longyear: <http://www.boartlongyear.com>

3.0 DEFINITIONS

Cleanout Depth – The depth to which the end of the drill string has reached after an interval of cutting.

Drill String – The complete air rotary/air hammer drill assembly including hammer/bit, casing collars and stabilizers, and drill casing.

Hoist Line – Wire rope used on the draw works to hoist and lower loose augers, the removable center plug, sampling rods and split barrel, or the down-hole sampling hammer assembly.

Mast – A load-bearing structure on a drilling rig used for supporting the rotation head, pulldown hydraulics, hoisting lines, etc. It must be constricted to safely carry the expected loads encountered in drilling and completion of wells of the diameter and depth for which the rig manufacturer specifies the equipment. To allow for contingencies, it is recommended that the rated capacity of the mast should be at least twice the anticipated weight of the load or normal pulling load.

Oscillator Housing – Uses two eccentrics, counter-rotating balance weights that are timed to direct 100% of the mechanical vibration energy at 0 degrees and 180 degrees to the drill pipe. An air spring system insulates the drill rig from the vibration. Counterbalances produce resonant energy waves that minimize borehole friction on the drill string.

Dual-Casing System – A 4-inch to 8-inch diameter core barrel, which is advanced for sampling purposes with an appropriately sized (6- to 10-inch diameter) outer drill pipe (casing). Typically, the core barrel is advanced ahead of the drill pipe for the length of the core run. The outer pipe is then advanced over the core barrel to keep the hole open for core and barrel retrieval. The outer drill pipe may be kept in the ground once total depth has been reached and may be used as casing material for the installation of wells.

4.0 SONIC DRILLING METHODOLOGY AND CONSIDERATIONS

Sonic drilling is a subsurface exploration technique that utilizes a dual-cased drilling system that is advanced hydraulically and with mechanical vibration (between 50 and 150 Hertz). The dual-cased system uses an inner core barrel, an outer large-diameter drill pipe, and a drill bit that are advanced during drilling. Sonic drilling commonly utilizes the vibration in consortium with a slow rotation and down-pressure to advance the drill string. The drill bit generates sinusoidal vibration waves that cause a cutting action at the bit face.

The cutting actions include fracturing, shearing, or displacement of the subsurface materials. Displacement often occurs as the vibration fluidizes unconsolidated deposits causing the material to move away from the drill string. Most of the formation, however, enters the core barrel and is contained within distinct plastic liners. Fracturing action is typically associated with drilling through cobbles and boulders, while shearing action is associated with drilling through elastic formations such as dense silt, clay, or shale.

Rotasonic/Rotasonic drilling is a modification of sonic drilling in which the core barrel is advanced sonically until full. The casing is then advanced sonically and in some cases with the use of water to cool the drill head and provide additional stability of the core upon retrieval. This method assists in reducing the overall system heat generation, which in turn prolongs equipment life, and reduces time. However, the application of water increases the volume of investigation derived waste over traditional sonic drilling methods.

Sonic drilling is typically utilized for soils that are too hard/dense for hollow stem auger borings and in which other methods, such as fluid rotary, are not considered cost or time effective due to proposed borehole depths. Standard penetration tests may be conducted with a sonic drilling rig with the appropriate equipment. Consult the **SOP for Drilling – Soil Boring and Rock Coring Oversight** for method guidance if this testing is designated in the field activities plan (FAP). Sonic drilling methods are also capable of sampling bedrock, however the method results in poor quality rock recovery which may not meet the data objectives of an environmental drilling program. If required to complete bedrock borings it is recommended to complete the soil sampling and casing deployment using the sonic drilling methods and then switch to more conventional rock coring techniques as discussed in the **SOP for Drilling – Soil Boring and Rock Coring Oversight**.

Potential difficulties in using the sonic drilling technique include: the potential for downtime as a result of the complexity of the drill head mechanics; vibration may cause heat to develop which may result in loss of contaminants from samples (particularly volatile organic compounds) or failure of the drill bit; fine-grained particles may migrate to the periphery of the core due to the vibratory action; and during retraction of the outer casing, the casing is vibrated which may cause the pin or box at the joints to fail resulting in casing remaining in the ground.

5.0 PROCEDURE

This section contains both the responsibilities and procedures involved with drilling oversight and sampling. Proper procedures are necessary to ensure the quality and integrity of the samples.

5.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that drilling activities are conducted in accordance with this SOP and any other appropriate procedures. This will be accomplished through staff training and by maintaining quality assurance/quality control (QA/QC).

The PM will select the appropriate drilling methodology based on the objectives of the project. The PM is also responsible for ensuring that the site-specific FAP is clear in defining drilling methods.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to drilling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead.

5.1.1 Preparation

Utility Locate

Prior to mobilizing to a site, the PM or field operations lead will ensure that the local utility “one call” service has been notified (e.g. Dig Safely New York). Typically the drilling subcontractor will be responsible to call in the utility ticket. Confirmation of the notification and the ticket number will be requested by the PM or field operations lead for the public records. No work may proceed at the site until the ticket has been logged and all utilities have responded/marked out.

If conducting borings at an active site, the project or field engineer/geologist must contact the appropriate site personnel necessary to receive clearance to drill at specified locations. The names of the personnel authorizing clearance will be documented in the field logbook. The exact location of each boring shall also be reviewed by responsible site personnel to ensure that the area is free of the facility-owned buried utilities. Surface geophysics may be conducted to identify the locations of subsurface facility-specific structures (e.g., drain lines, septic tanks, etc..) and soft dig methods (hand clearing with shovels, post hole diggers, hand augers) may be required.

Drilling locations shall be no closer than 25 feet to overhead utilities or within 10 feet of buried utilities.

Upon arrival at the site the field operations lead will complete the Utility Clearance Form (**Attachment S18A**) to document that utility locate activities and markout have been completed prior to the initialization of drilling activities.

Equipment Selection and Materials Considerations

- A drill rig of sufficient horsepower, hoisting capacity, and torque to drill borings of sufficient width and depth as specified in field activities plan (FAP) will be selected to complete the work.
- The rig should have the drill pipe handling system built into the drill mast. Optionally, a support truck may be mobilized with an on-board crane system for handling the drill piping.
- Casing, bit, and core barrel of sufficient size to complete the borings. Drill casings may need to be oversized to install bedrock casings.
- If lubricants are needed on rod joints, non-petroleum based lubricants will be used. If available, Teflon-based thread compound is recommended, however these compounds should be limited in use on site if sampling for emerging contaminants per- and polyfluoroalkyl substances (PFAS).
- A pump and tremie piping for pumping annular grout seal into the borehole. -Appropriate decontamination equipment (steam cleaner, materials for a decon pad, etc.) as necessary.

The following materials will be available, as required:

- Materials (e.g. drums, roll-offs, fractionation tanks) for investigation derived wastes (IDW) as specified in the FAP;
- Personal protective equipment, monitoring equipment, and other health and safety equipment as specified in the project specific health and safety plan (HASP);
- Appropriate decontamination equipment (steam cleaner, materials for a decon pad, etc.) as specified in the QAPP or FAP;
- Monitoring well and other construction materials if specified in the FAP;
- Stainless steel trowels or spatulas;
- Aluminum Foil;
- Paper Towels;
- Measuring device (e.g. engineer's scale tape or rule);
- Appropriate sample containers and Field Data Records;
- Photoionization detector (PID);
- Camera;
- Field notebook.

5.2 Field Procedures

Data and Records Management

The following records will be maintained by the field geologist/engineer:

- Field Logbook
- Soil Boring Log field data records
- Well Installation Diagram field data records

In the field book, the field geologist/engineer shall record the name of the drilling firm and the names of the driller and his assistant(s). The date, project location, project number, and weather conditions shall be recorded as well.

An accurate time log of drilling activities shall be kept. This log shall be kept in the field logbook and shall include at a minimum, the following:

- Time driller and rig arrive on site
- Time drilling begins
- Any delays in the drilling activities and the cause of such delays
- Time drillers go off site
- Duration of decontamination and investigation derived waste handling
- Down time (those periods when drilling activities cease due to equipment malfunctions, weather, and ordered stoppages)

Monitoring equipment for field screening (PID) and community air monitoring programs will be calibrated daily as per manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**example attached**). Make note of calibration variances or spanning to non-standard specifications.

Soil boring information including standard penetration depth information, sampling intervals, and soil descriptions will be recorded on the Soil Boring Log field data records (**example attached**). See the **Description and Identification of Soil Samples SOP** (see Table A-1 for the SOP #) for description methodology.

Drilling Procedures

1. Prior to mobilizing to the drilling location, the drill operator and the engineer/geologist will inspect the drill equipment for proper maintenance and condition. Out-of-specification materials will not be utilized or will be repaired.

2. Physical barriers or warning lines will be deployed in accordance with the HASP to create an exclusion zone to keep non-qualified personnel away from the rig. All materials and equipment will be staged in the exclusion zone.
3. Once the drill site is prepared, the drill should be stabilized and leveled using the hydraulic outriggers. Wooden blocking should be placed under the outrigger hydraulic rams on soft surfaces to stabilize the rig. The mast should be raised slowly such that no shifting of the rig occurs.
4. Careful measurement of all drilling tools, samplers, and casing must be exercised during all phases of the boring operations, to ensure maximum quality and recovery of the sample.
5. The borehole will be advanced by driving the outer casing, inner casing and core sampler in 5 or 10-ft runs (depending on the rig capacity or tooling capability).
6. The inner casing and core sampler is driven to the length of the chosen run. Drilling water is typically not used during this process to avoid impacting the environmental sample
7. The outer casing is then driven the length of the run to override the inner core casing to allow for retrieval of the soil sample by bringing the inner casing to the surface. Drilling water is typically used during this process to avoid binding the casings.
8. At the surface, a polyethylene or other appropriate material sample bag will be slid over the outside of the core sampler and the soils will be gently extruded into the sample bag.
9. The sample bag will be opened by the driller and laid out for the field geologist/engineer. A fresh face of the sample will be prepared by using a clean flat edged scraper (e.g. paint scraper) in perpendicular motions to the sample orientation. The resultant fresh face will be screened using a PID for volatiles and carefully examined, noting all soil characteristics, color seam, disturbance, etc. (See **the Description and Identification of Soil Samples SOP (see Table A-1 for the SOP #)** for description methodology). For the field screening of the sample the PID inlet should be just above the soil surface and a hand should be cupped over both for an interval for a period of several seconds to get an accurate reading. This allows for the buildup of VOCs for measurement without interference from ambient air. Colder temperatures will inhibit volatilization and may require longer screening times to get accurate readings.
10. Collect photographs of the soil in the sampler. The sample should be placed in a good light, preferably against a solid colored background. A ruler for scale and a tag identifying the sample should be placed in the picture. The identifier tag must have the sample number, depth and project name or number written so as to be legible in the photograph. Any photographs taken must be recorded in the field logbook.
11. A representative sample is selected based on the sampling objectives outlined in the FAP and is collected using the appropriate sampling method and container as outlined in the **Soil Sampling and Field Preservation of VOC and GRO Samples [SOP #s listed on Table A-1]** for soil sampling methods.
12. Following the collection of representative samples for chemical and/or geotechnical analyses, remaining soil material will be collected into a separate container for VOC headspace screening (see below).

13. Steps 4 to 11 will be repeated, as necessary, until the bottom of the borehole, as outlined in the FAP, is reached (e.g. refusal or a predetermined depth). Frequency of sample collection will either be continuous or at predetermined depths.
14. After the terminal depth of the borehole has been achieved, and an environmental monitoring well will not be installed, the borehole should be backfilled with a cement/bentonite grout. Grout will be injected using a small diameter pipe to the base of the borehole. Drilling fluids within the borehole will be displaced upwards, collected in the drilling wash tub, and will be containerized as investigation derived waste. Alternatively, grout may be injected using the drill string in the same manner as the drilling fluids. Care should be taken to ensure the grout does not bridge forming gaps or voids in the grout column. Casing and augers will be slowly retracted during borehole abandonment to prevent the bottom of the casing/auger from rising above the top of the grout column. Grout will be mixed and injected in multiple lifts until flush with the ground surface. Following grouting, barriers should be placed over grouted boreholes as the grout is likely to settle in time, creating a physical hazard. Grouted boreholes will typically require at least a second visit to “top off” the hole.
15. If a monitoring well is to be installed see **Monitoring Well and Microwell Installation SOP** for methodology and installation details.
16. Decontaminate non-disposable equipment or tools that may have come into contact with subsurface soil in accordance with the FAP.
17. Discard all disposable equipment used during sampling activities in a designated location.
18. The approximate location of the boring will be marked with a wood stake colored with highly visible spray paint and/or flagging. The boring number will also be written on the stake to identify the sample location for surveying purposes.

Once the boring/well installation is complete, the rig mast will be lowered, the outriggers will be lifted and the rig will be moved off of the boring location. All cuttings or other waste will be containerized or disposed of in accordance with the FAP.

Soil Headspace Screening

The purpose of the soil headspace screening procedure is to screen soil sample headspaces for total ionizing VOCs. This is a semi-quantitative method used to identify the presences, absence, and relative concentrations of VOCs in soil. Headspace screening is performed with a PID. Headspace readings may be completed in between sample runs. Headspace readings should be transcribed on to the soil boring log field data record.

1. Record and document background VOC readings in ambient air. If it is not feasible to screen samples in an area with a clean background, document the highest background reading.
2. Half fill a clean jar or Ziplock™ type plastic bag with soil. Quickly cover the jar with aluminum foil or close the plastic bag and label the container.
3. Vigorously shake the sample to disperse soil and wait for approximately 5 minutes. Record the ambient temperature at which screening is performed. If outside temperatures are below 50°F, try

to warm the samples in a heated vehicle or building.

4. Shake the sample again after 5 minutes.
5. Insert the tip of the PID through the foil or into the plastic bag and record the highest meter response, typically after approximately 3 to 15 seconds.
6. After screening all samples, re-check background and record significant variations.

The PID has a reliable reporting limit of 1 part per million in air. Readings at or below the reporting limit should be reported as not-detected “ND”.

Screening results will vary based on sample temperature, compounds present, age of the sample, and the degree to which the sample has been agitated and crumbled. Field personnel should remain consistent in their headspace measurement methodology to avoid biasing samples.

Monitoring Well Installation

Bedrock boreholes may either be left open or have discrete monitoring wells installed for groundwater sampling. Well completion details will be outlined in the FAP. Further guidance is available in **Monitoring Well and Piezometer Installation SOP**.

6.0 ATTACHMENTS

Utility Clearance Form

Soil Boring Log

Field Instrument Calibration Record

Utility Clearance Form

Site Name: _____
 Site Address: _____
 Project Manager Name: _____
 Locations cleared by facility? _____

Project No./Task No.: _____
 One Call Ticket No.: _____
 Ticket Good until: _____
 PM Phone No.: _____
 Date Cleared: _____

Utility Clearance:

Potential Utilities		Identified		Colors	Utility Company Name(s)	Utilities
Member of One Call	*Non Members	Utility Marked	Utility Responded not Present			
						WHITE - Proposed Excavation
						**PINK - Temporary Survey Markings
						RED - Electric Power Lines, Cables, Conduit and Lighting Cables
						YELLOW - Gas, Oil, Steam, Petroleum or Gaseous Materials
						ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit
						BLUE - Potable Water
						PURPLE - Reclaimed Water, Irrigation and Slurry Lines
						GREEN - Sewers and Drain Lines

*Contact local municipality

** Survey markings need to be protected. If disturbed or destroyed, replace markings.

Private Utility Locator/Geophysical Survey

Method to be used: _____ Pipe and Cable Location
 _____ Ground Penetrating Radar
 _____ Magnetics and Electromagnetics

Non-Destructive Excavation Method to be used

_____ *Hand Dig
 _____ Soil Vacuum
 _____ Air Knife
 _____ Water Knife
 * Use electrically insulated gloves if potential for power lines

Field Clues Observed/Evaluated:

_____ Overhead power lines	_____ Patches in concrete floors	_____ Guard shack – service utilities
_____ Cell phone/radio antennas	_____ Drainage ditches in area	_____ Bathroom and kitchen facilities
_____ Trench patches	_____ Utility vaults	_____ Radiant heat systems in slabs (ask)
_____ Trench settlement	_____ Transformer pads	_____ Cooling units outside building
_____ Trench drains	_____ Conduits from power panels into slab	_____ Process water to equipment in factory
_____ Utility manholes	_____ Above ground propane tanks	_____ Sprinkler system landscaping
_____ Manholes just outside building	_____ Fire protection rooms	_____ Grounding systems near perimeter
_____ Valve risers	_____ Fire protection lines	_____ Water tower on site.
_____ Floor cleanout covers	_____ Fire hydrant locations – valves in ground	_____ Foundation drains - building perimeter
_____ Floor drains	_____ Footings under structural columns	

Additional Notes/Remarks:

Confidence Level that All Utilities have been identified:

_____ High _____ Medium High _____ *Moderate _____ *Medium Low _____ *Low

*Contact PM. Get PM and OM permission prior to proceeding

*Discussed with
 OM? _____

*Cleared by PM? _____

SOIL BORING LOG											
EARTH ENVIRONMENT Engineering and Geology P.C. 2 Monument Square, Suite 200, Portland Maine 04101					Project Name:			Boring ID:			
					Project Location:			Page No.			
					Project No.:		Client:	of:			
Boring Location:					Refusal Depth:		Total Depth:		Bore Hole OD:		
Weather:					Soil Drilled:		Drilling Method:		Casing Size:		
Subcontractor:					Rock Drilled:		Protection Level:		Sampler:		
Driller:					Date Started:		Date Completed:		Sampler ID/OD:		
Rig Type/Model:					Logged By:		Checked By:				
Reference Elevation:					Water Level:		Time:				
Drilling Information					Sample Information			Sample Description and Classification		USCS Classification	Remarks
Depth (feet bgs)	Sample Number	Penetration (ft) / Recovery (ft)	Blow Counts	N Value	PID Field Screening (ppm)	PID Head Space Reading (ppm)	Analytical Sample Depth (ft)				
NOTES:											

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT LOCATION: _____

WEATHER CONDITIONS (AM): _____

WEATHER CONDITIONS (PM): _____

TASK NO: _____

DATE: _____

MACTEC CREW: _____

SAMPLER NAME: _____

SAMPLER SIGNATURE: _____

CHECKED BY: _____

DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

AM CALIBRATION

Start Time _____/End Time _____

Units

Standard Value

Meter Value

*Acceptance Criteria (AM)

pH (4)

SU

4.0

+/- 0.1 pH Units

pH (7)

SU

7.0

+/- 0.1 pH Units

pH (10)

SU

10.0

+/- 0.1 pH Units

Redox

+/- mV

240

+/- 10 mV

Conductivity

mS/cm

1.413

+/- 0.5 % of standard

DO (saturated)

%

100

+/- 2% of standard

DO (saturated)

mg/L¹ (see Chart 1)

+/- 0.2 mg/L

DO (<0.1)

mg/L

<0.1

< 0.5 mg/L

Temperature

°C

Baro. Press.

mmHg

POST CALIBRATION CHECK

Start Time _____/End Time _____

Standard Value

Meter Value

*Acceptance Criteria (PM)

7.0

+/- 0.3 pH Units

240

+/- 10 mV

1.413

+/- 5% of standard

+/- 0.5 mg/L of standard

TURBIDITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Units

Standard Value

Meter Value

<0.1 Standard

NTU

<0.1

20 Standard

NTU

20

100 Standard

NTU

100

800 Standard

NTU

800

Standard Value

Meter Value

*Acceptance Criteria (PM)

<0.1

+/- 0.3 NTU of stan.

20

+/- 5% of standard

100

+/- 5% of standard

800

+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Background

ppmv

<0.1

Span Gas

ppmv

100

<0.1

within 5 ppmv of BG

100

+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Methane

%

50

O₂

%

20.9

H₂S

ppmv

25

CO

ppmv

50

50

+/- 10% of standard

20.9

+/- 10% of standard

25

+/- 10% of standard

50

+/- 10% of standard

OTHER METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

See Notes Below for Additional Information

☐

Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☐

Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: _____

Lot#/Date Produced: _____

Trip Blank Source: _____

Sample Preservatives Source: _____

Disposable Filter Type: _____

Calibration Fluids / Standard Source: _____

- DO Calibration Fluid (<0.1 mg/L)

- Other

- Other

- Other

Portland FOS

Laboratory provided

Laboratory provided

in-line 0.45µm cellulose

Portland FOS

Cal. Standard Lot Number

Exp. Date

pH (4)

pH (7)

pH (10)

ORP

Conductivity

<0.1 Turb. Stan.

20 Turb. Stan.

100 Turb. Stan.

800 Turb. Stan.

PID Span Gas

O₂-LEL Span Gas

Other

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

EARTH ENVIRONMENT

Engineering and Geology P.C.

2 Monument Square, Suite 200, Portland Maine 04101

FIELD INSTRUMENT CALIBRATION RECORD

A3_Field_Instrument_Calibration_Record

8/29/2025

SOP # S20

EEEG STANDARD OPERATING PROCEDURE #S20

HEAVY EQUIPMENT DECONTAMINATION OVERSIGHT

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Tige Cunningham, NRCC-EAC, QA Officer

August 28, 2025

Date

Reviewed

Date

HEAVY EQUIPMENT DECONTAMINATION

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes guidelines for use by field personnel overseeing the decontamination of heavy equipment when conducting environmental investigations.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure in the execution of planned activities must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

U.S. Environmental Protection Agency (USEPA), 1985. "Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites." EPA/600/2 85/028.

USEPA, 1987, Compendium of Superfund Field Operations Methods, EPA 540/P-87/001a, OSWER 9355.0-14, September.

USEPA, 1988, EPA Guidelines for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final OSWER Directive 9355.3-01, August.

USEPA, 1991, Management of Investigation Derived Wastes During Site Inspections, EPA 540/G-191/009, May.

3.0 DEFINITIONS

Heavy Equipment – Drill rigs, excavators, dozers, back-hoes, trucks or other similar type machinery used to drill soil borings, break concrete, excavate soil or other similar type activity.

Laboratory Grade Detergent – A standard brand of laboratory-grade detergent, such as Alconox® or Liquinox®. If investigating for PFAS, Decon 90 or other detergents containing PFAS and will not be utilized for decontamination. Sites being sampled for 1,4-dioxane should use Alconox® detergent instead of Liquinox®.

Potable Water – Water dispensed from a municipal water system or well used and approved for drinking.

4.0 PROCEDURE

This section provides requirements for heavy equipment decontamination procedures to be followed. Decontamination at sites being investigated for PFAS will require a source of PFAS free water.

4.1 Responsibilities

Compliance with this procedure is the responsibility of project management and field personnel. This SOP and the project work plans should be reviewed before overseeing heavy equipment decontamination at the project site.

Project Manager

The Project Manager (PM) has the responsibility for ensuring that decontamination of heavy equipment is properly performed through staff training.

Field Operations Lead

The Field Operations Lead has the responsibility for periodic review of procedures and documentation associated with the decontamination of heavy equipment. If perceived variances occur, the field operations lead is also responsible for issuing notices of nonconformances and requesting corrective actions. Additionally, the field operations lead will perform inspections and monitoring of the decontamination activities.

Field Personnel

Project staff assigned to field activities are responsible for ensuring that subcontractors or equipment operators properly decontaminate heavy equipment associated with those tasks. Project staff are also responsible for documenting the decontamination activities in a field logbook as specified in the FAP.

4.2 Preparation

Equipment Selection Considerations

Subcontractor personnel will provide decontamination materials and operate steam cleaning equipment. The following list of equipment and materials may be used for heavy equipment decontamination:

- Cleaning materials which may include tap (potable) water, soap and/or detergent solutions, nitric acid solutions, and methanol. Specific requirements based on the site contaminants of concern will be detailed in the site- specific FAP.
- Personal protective equipment as defined in project Health and Safety Plan (HASP).
- Investigation Derived Waste containers (drums, roll offs, fractionation tanks)
- Scrub brushes.
- Pressure washer or steam cleaner.

4.3 Field Procedures

Decontamination Area

A decontamination area will be set up in an area exclusively for decontamination of heavy equipment. which will be conducted within the station.

At a minimum, the station will be constructed such that all rinsates, liquid spray, soil, debris and other decontamination wastes are fully contained and may be collected for appropriate waste management and disposal. The area may be as simple as a bermed pad lined with polyethylene sheeting. More sophisticated designs involving self-contained metal decontamination pads in combination with bermed polyethylene sheeting may also be used, depending on project-specific requirements. These requirements along with specific equipment and construction specifications for the decontamination area will be provided in the FAP.

Decontamination of Downhole Equipment

Downhole drilling equipment (including but not limited to drill pipe, drive casing, drill rods, bits, tools, etc.) will be thoroughly decontaminated before mobilization to site and between borings or wells at each site or as required in the FAP. The standard procedure will be performed as described below. Appropriate PPE (as specified in the project HASP) must be worn by all personnel involved with the task to limit personal exposure.

- Equipment caked with drill cuttings, soil, or other material will initially be scraped or brushed to remove gross soil contamination. The scrapings will be containerized and appropriately disposed of in accordance with the FAP.
- Equipment may be washed with a laboratory grade detergent prior to high-pressure washing or steam cleaning.
- Equipment will then be sprayed with potable water using a high-pressure washer or steam cleaner.
- Rinsate blanks will be collected from washed equipment that directly contacts soils that will be sampled (e.g. split spoon samplers) which will be reused. This will consist of water from the final rinse which is collected directly into sample containers.
- Decontaminated downhole equipment (such as drill pipe, drive casing, bits, tools, bailers, etc.) will be placed on clean polyethylene plastic sheeting to prevent contact with contaminated soil and allowed to air dry.

Decontamination of Heavy Equipment

Heavy equipment (e.g. drill rigs, development rigs, backhoes, trucks, and other earthmoving equipment) will be decontaminated between drilling sites. Decontamination will be performed in accordance with the FAP. The standard procedure will be performed as described below. Appropriate personal protective

equipment (as specified in the project HASP) must be worn by all personnel involved with the task to limit personal exposure.

- Heavy equipment caked with drill cuttings, soil, or other material will be initially scraped or brushed to remove bulk soil at the drilling or work location. The scrapings will be containerized and appropriately disposed of in accordance with the FAP.
- Heavy equipment will then be moved to the decontamination pad and configured so that fluids from decontamination activities will be collected by the impermeable liner.
- Equipment may be washed with a laboratory grade detergent prior to high-pressure washing or steam cleaning.
- The equipment is then sprayed with potable water using a high-pressure washer or steam cleaner as outlined in the FAP.
- Between boreholes at the same site, the back end and equipment decks of the drilling rigs will be washed with potable water until surfaces are visibly free of soil buildup.
- During the decontamination effort, fluid systems should be inspected for any leaks or problems, which might potentially result in an inadvertent release at the site, thereby contributing to the volume of waste or contamination.

Decontamination activities will be documented by the field geologist/engineer in the field logbook. Decontamination fluids will be containerized in Investigation Derived Waste handling containers as specified in the FAP. Decontamination areas should be covered with plastic when not in use to prevent collection of rainwater which will then be required to be handled as Investigation Derived Waste.

SOP # S21

EEEG STANDARD OPERATING PROCEDURE #S21

FIELD EQUIPMENT DECONTAMINATION

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Tige Cunningham, NRCC-EAC, QA Officer

August 28, 2025

Date

Reviewed

Date

FIELD EQUIPMENT DECONTAMINATION

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the methods to be used for the decontamination of all field equipment which becomes potentially contaminated during a sample collection task.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure in the execution of planned activities must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 REFERENCES

U.S. Environmental Protection Agency (USEPA), January 1986. "Decontamination Techniques for Mobile Response Equipment Used at Waste Sites (State-of-the-Art Survey)." EPA/600/52-85/105.

USEPA, March 1985. "Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites." EPA/600/2 85/028.

3.0 PROCEDURE

All reuseable field equipment that comes in contact with site media to be samples should be included in the decontamination process. Decontamination is performed as a quality assurance measure and a safety precaution. It prevents cross-contamination between samples and helps to maintain a clean working environment for the safety of all field personnel.

Decontamination at sites being investigated for PFAS will require a source of PFAS free water. A standard brand of laboratory-grade detergent, such as Alconox® or Liquinox® will be used. If investigating for PFAS, Decon 90 or other detergents containing PFAS and will not be utilized for decontamination. Sites being sampled for 1,4-dioxane should use Alconox® detergent instead of Liquinox®.

Decontamination is mainly achieved by rinsing with liquids which may include: soap and/or detergent solutions, tap-water, deionized water, acid solutions, and methanol. Equipment will be allowed to air dry after being cleaned or may be wiped dry with clean clothes or paper towels if immediate re-use is needed.

The frequency of equipment use dictates that most decontamination be accomplished at each sampling site between collection points. Waste products produced by the decontamination procedures, such as waste liquids, solids, rags, gloves, etc. must be collected and disposed of properly in accordance with the FAP.

3.1 Responsibilities

Compliance with this procedure is the responsibility of project management and field personnel. This SOP and the project work plans should be reviewed before implementing field equipment decontamination at the project site

Project Manager

The Project Manager (PM) has the responsibility for ensuring that decontamination of field equipment is properly performed through staff training.

Field Operations Lead

The Field Operations Lead has the responsibility for periodic review of procedures and documentation associated with the decontamination of field equipment. If perceived variances occur, the field operations lead is also responsible for issuing notices of nonconformances and requesting corrective actions. Additionally, the field operations will perform inspections and monitoring of the decontamination activities.

Field Personnel

Project staff assigned to field activities are responsible for ensuring that subcontractors or equipment operators properly decontaminate field equipment associated with those tasks. Project staff are also responsible for documenting the decontamination activities in a field logbook.

It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and to ensure that any contaminants are not negligently introduced to the environment.

3.2 Preparation

Equipment Selection and Sampling Considerations

Cleaning materials may include tap (potable) water, deionized water, and soap and/or detergent solutions, nitric acid solutions, and methanol. Specific requirements will be detailed in the site-specific FAP. The following list of equipment and materials includes the necessary items for field equipment decontamination:

- Personal protective equipment as defined in project Health and Safety Plan (HASP).
- Paper towels
- Disposable gloves
- Waste storage containers (drums, boxes, plastic bags). HDPE containers if PFAS is included in sampling program
- Cleaning containers (Plastic buckets, galvanized steel pail)
- Cleaning brushes
- Laboratory-grade detergent
- Stainless steel spray bottles
- Deionized water or other approved water.

3.3 Field Procedure

Soil, Sediment, Surface Water and Air Sampling Equipment

1. Remove any solid particles from the equipment or material by brushing and then rinsing with clean water. This initial step is performed to remove gross contamination.
2. Wash equipment with a soap or detergent solution and brush.
3. Rinse with tap-water.
4. Rinse with deionized water.
5. Repeat entire procedure or any parts of the procedure if necessary, to remove all traces of solids.
6. If sampling equipment is not to be used immediately at another location, wrap the equipment in aluminum foil and store in a safe place. If equipment is to be used in PFAS sampling, do not wrap equipment in aluminum foil.

Submersible Pump Decontamination Procedures

This procedure will be used to decontaminate submersible pumps between groundwater sample collection points and at the end of each day of use. Dedicated tubing should be used for each well so no decontamination of the tubing is needed. The dedicated tubing will be placed back into the monitoring well and only the pump will be decontaminated as described in the following subsections.

The following materials will be used:

- plastic or PVC upright cylinder or bucket
- 5-10-gallon plastic water storage containers. HDPE container should be used to store water if PFAS is included in sampling program.
- soap or detergent solution and brush
- Deionized water or other approved water
- Stainless steel spray bottle
- Paper towels

During decontamination, the submersible pump will be placed on a clean surface (sheet of plastic) or held away from ground.

1. Decontaminate the outer surface of the submersible pump using a potable water rinse followed by a deionized water rinse.
2. Connect discharge tubing to the end of the pump and place the submersible pump upright in the cylinder and fill the cylinder with potable water and detergent. The end of the tubing should be clamped to an empty water storage container
3. Activate the pump in the forward mode withdrawing water from the cylinder.
4. Continue pumping until the water in the cylinder is pumped down and air is drawn through the pump. At this time air pockets, will be observed in the discharge line. Shut off the pump immediately.
5. Using the water remaining in the cylinder, rinse the power cord (excepting the plug or battery

connectors) by pouring the water carefully over the coiled lines.

6. Repeat steps 3 to 5 twice using deionized water. Pump or drain all the remaining water from the tubing.
7. When reaching the next monitoring well place the pump in the well casing and wipe dry both the power lines with a clean paper towel as the pump is lowered.

SOP # S23

EEEG STANDARD OPERATING PROCEDURE #S23

MONITORING WELL DEVELOPMENT PROCEDURE

August 31, 2025

New York State Department of Environmental Conservation

Program QAPP – D009809

Revision 2

APPROVED:



Tige Cunningham, NRCC-EAC, QA Officer

August 28, 2025

Date

Reviewed

Date

MONITORING WELL DEVELOPMENT PROCEDURE

1.0 PURPOSE

This standard operating procedure (SOP) describes the protocol to be followed during the development of monitoring wells. The objectives of monitoring well development are to remove sediment that may have accumulated during well installation, to consolidate the filter pack around the well screen, and to enhance the hydraulic connection between the target zone and the well.

This procedure is not intended to obviate the need for professional judgment to accommodate unforeseen circumstances. Deviation from this procedure in the execution of planned activities must be approved by the project manager and documented in the field logbook and/or field data records.

2.0 PROCEDURE

Well development shall be performed as soon as practical after well installation, but not sooner than 48 hours following placement of the grout seal. Weather conditions may increase grout set time and, consequently, further delay development. If the well does not contain a grout seal (e.g. an open rock borehole), then well development can commence immediately after well installation.

The primary objective of well development of environmental monitoring wells is to ensure that an appropriate hydraulic connection is established so that the well will serve its intended purpose to provide water quality and/or groundwater head elevation data. Well development takes on more significance for wells intended for water supply or hydraulic control of groundwater plumes.

This procedure may not be appropriate for wells where gross contamination is observed (e.g., the presence of NAPL).

2.1 Responsibilities

Project Manager

The project manager (PM) is responsible for ensuring that sample collection activities are conducted in accordance with this SOP and any other appropriate procedures. This will be accomplished through staff training. The PM will select the appropriate sampling methodology and analytical program based on the objectives of the sampling.

Field Operations Lead

The field operations lead is responsible for periodic observation of field activities and review of field generated documentation associated with this SOP. The field operations lead is also responsible for implementation of corrective action (i.e. retraining personnel, additional review of work plans and SOPs, variances to QC sampling requirements, issuing non-conformances, etc.) if problems occur.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing tasks according to specifications outlined in this SOP and other appropriate procedures. All staff are responsible for reporting deviations from procedures to the PM or field operations lead and document the deviation in the field logbook and/or field data record.

2.2 Preparation

Equipment

The following equipment may be used during well development. Site-specific conditions may warrant addition or deletion of items from this list.

- Submersible pump, peristaltic pump, inertial (e.g. Waterra) pump, and/or bailer. Pumps should be PFAS free if PFAS will be included in the analytical program.
- Surge block.
- Appropriate size/type tubing for selected pump.
- Container for purge water (5-gallon bucket or carboy)
- Container with known volume (e.g., measuring cup) for flow estimation.
- Container for investigation derived purge water (drums or fractionation tank).
- Water level indicator.
- Water quality measurement equipment (YSI, Turbidity meter)
- Stopwatch or timer.
- Clear glass jars (at least 2).
- Well Development Field Data Record.
- Field notebook; and
- Pens with indelible ink.

Extraction Method Considerations

Development of wells will be accomplished with a submersible pump, peristaltic pump, and/or bailer. Bailers should be used to develop wells only where the volume of water is so small that other development methods are clearly inappropriate. Pumps used for well development will be periodically raised and allowed to drain back into the hole in order to induce flow out through the well screen.

A surge block may be used to flush the well screen filter pack of fine sediment in instances where field personnel expect that development may be improved by surging. Surging will be conducted slowly to reduce disruption to the filter pack and screen. Following surging, the well will be pumped or bailed again to remove sediment drawn in by the surging process until suspended sediment is reduced to acceptable levels (see below). Water should not be added to the well to aid in development.

Pump selection for well development will depend on variables specific to each monitoring well program. Factors that must be considered include:

- Depth to water at the site.
- diameter of the well; and
- site specific development criteria (e.g. required minimum purge volumes).

Extraction equipment pros and cons:

Peristaltic Pumps:

Pros: user friendly, suitable for use in small diameter wells (<1-inch), minimal effort to setup, controllable flow rates

Cons: limited to wells with groundwater <25 ft below ground surface, pump head can easily clog in turbid wells, limited flow rates (insufficient for large purge volumes), limited capacity to surge well screens

Submersible Pumps: Bladder Pumps, Impeller Pumps, Pneumatic Pumps.

Pros: capable of pumping in wells with depths to water up to 200 ft bgs, capable of evacuating water at a high flow rate (1 to 5 gpm), less prone to clogging in turbid wells (impeller pumps less so), pumps can serve as surge blocks

Cons: less user friendly, requires additional equipment such as a generator or compressed gases

Note: PVC impeller pumps should be selected over stainless-steel construction as they are typically designed for the harsh conditions observed during well development and are less prone to failure (overheating, seizing). If samples collected from the monitoring well are analyzed for PFAS compounds, the submersible pumps used in development must be PFAS free.

Inertial Pumps: Waterra Pumps

Pros: suitable for use in small diameter wells (<1-inch), capable of removing water from wells with depths to water up to 200 ft bgs, capable of evacuating water at a high flow rate (up to 4 gpm), less prone to clogging in turbid wells, minimal down well tooling (tubing, check valve, surge block)

Cons: can require additional equipment such as a generator, health and safety considerations to secure pump actuator and tubing, tubing may need to be pulled from the well periodically to replace worn foot valves.

Bailers

Pros: no limit to water depth, simplest evacuation method with minimal equipment, capable of evacuating water at a decent flow rate (0.5 gpm), suitable for evacuating very turbid water, bailer serves as a surge block

Cons: labor intensive, unlikely to meet turbidity goals, impractical for continuous water quality measurements for well stabilization

2.3 Field Procedures

1. Don personal protective equipment.
2. Upon reaching the well assess the condition of the well and record preliminary measurements:
 - a. measure depth to water and depth to bottom of the well (if a measuring point has not been marked, mark on the casing using a permanent marker or notch the casing using a small saw).
 - b. compare the measured depth to bottom to the well construction, estimate the amount of accumulated material in the well.
 - c. complete calculations for the amount of water in the well (see the field data record for calculations)
3. Set up equipment for desired development method and surge (long up and down motion) the well screen and bottom of the well using the pump, stainless steel bailer or tubing with surge block. This will mobilize fines that have settled in the bottom of the well and in the well screen filter pack for removal during well development.
4. Initiate well development, water should be evacuated at a high enough rate to stress the well without dewatering the well screen.
5. Record flow measurements, depth to water, and water quality measurements periodically (~ 5 to 10 intervals).

For wells where sampling will not occur for at least 14 days, the following criteria will be met:

1. the well water is clear to the unaided eye (based on observations of water clarity through a clear glass jar).
2. the sediment thickness remaining in the well is less than one percent of the screen length; or
3. development has been conducted for more than 2 hours.

For wells that will be sampled sooner than 14 days, the following criteria should be met:

1. Water quality parameter measurements shall be made using instrumentation. Due to flow rates and methodology the water quality measurements may be collected from a clean container rather than a flow through cell. Water quality parameter instruments will be calibrated daily as per the manufacturer's instructions. Equipment information (make, model, and serial number) and calibration readings shall be recorded on the field instrument calibration record (**example attached**).
2. water quality parameters have stabilized or 2) the total volume of water removed from the well equals three times the standing water volume in the well plus the volume of drilling fluid lost (whichever occurs first).

Non-dedicated pumps shall be decontaminated prior to use in the next well and dedicated shall be used during subsequent sample collection from the well. The handling of development fluids (Investigation Derived Waste) shall be specified in the site-specific FAP.

Documentation

The following data shall be recorded for development on the field data record and in the field book:

- well designation.
- date of well installation.
- date of development.
- static water level before and after development.
- quantity of drilling fluid lost during drilling.
- quantity of standing water in well prior to development.
- depth from top of well casing to bottom of well.
- screen length.
- depth from top of well casing to top of sediment inside well, before and after development.
- physical character of removed water, including changes during development in clarity, color, particulates, and odor.
- type and size/capacity of pump and/or bailer used.
- height of well casing above/below ground surface.
- typical pumping rate.
- estimate of recharge rate; and
- quantity of water removed and time for removal.

3.0 ATTACHMENTS

Well Development Record

Field Instrument Calibration Record

WELL DEVELOPMENT RECORD



2 Monument Square, Suite 200, Portland Maine 04101

PROJECT NAME	
PROJECT NUMBER	
WELL INSTALLATION DATE	WELL DEVELOPMENT DATE

LOCATION ID	PAGE OF
START TIME	START DATE
END TIME	END DATE

WELL DIAMETER	IN	CASING DIAMETER	IN	MEASUREMENT POINT (MP)			
INITIAL WELL DEPTH (BMP)	FT	FINAL WELL DEPTH (BMP)	FT	SCREEN LENGTH	FT	PROT. CASING STICKUP (AGS)	FT
INITIAL DTW (BMP)	FT	SEDIMENT REMOVED (final well depth - initial well depth)	FT	SCREENED INTERVAL (BMP)	TO	TOC/TOR DIFFERENCE	FT
WATER COLUMN (initial well depth - initial depth to water)	FT	DTW AFTER DEVELOP. (BMP)	FT	PUMPING DEPTH (BMP)	FT	PID AMBIENT AIR	PPM
CALCULATED GAL/VOL (column X well diameter squared X 0.041)	GAL	FINAL RECOVERY DEPTH (BMP)	FT	APPROXIMATE RECHARGE RATE	FT/MIN	PID WELL MOUTH	PPM
TOTAL VOL. PURGED (mL per minute X total minutes X 0.00026 gal/mL)	GAL	FINAL RECOVERY TIME (elapsed)	MIN	FLUIDS LOST DURING DRILLING	GAL	END OF WELL DEVELOPMENT SAMPLE TAKEN?	Y N

FIELD PARAMETERS

[illegible]

EQUIPMENT DOCUMENTATION

☐ DEDICATED SUBMERSIBLE
☐ SURGE BLOCK
☐ BAILER
☐ _____ 2" ☐ _____
☐ GRUNDFOS
☐ _____ 2" ☐ 4"
☐ OTHER

	WATER LEVEL METER
	PID _____
	WQ METER _____
	TURB. METER _____
	OTHER _____
	OTHER _____
	OTHER _____

WELL DEVELOPMENT CRITERIA

Well water clear to the unaided eye?
Sediment thickness remaining in well <1.0% of screen length?
Total water removed = a minimum of 5x calculated well volumes plus 5x drilling fluids lost?
Turbidity < 5NTUs?
10% change in field parameters?

WAS DEVELOPMENT CRITERIA MET? ☐ ☐

	Y	N
Y		
N		

ADDITIONAL OBSERVATIONS

PURGE WATER	Y	N	NUMBER OF GALLONS	
CONTAINERIZED	☐	☐	GENERATED	_____

NOTES

Well Developer Signature:

Checked By:

Print Name:

Date:

SKETCH

WELL DEVELOPMENT RECORD

FIELD INSTRUMENT CALIBRATION RECORD

PROJECT NAME: _____

PROJECT NUMBER: _____

PROJECT LOCATION: _____

WEATHER CONDITIONS (AM): _____

WEATHER CONDITIONS (PM): _____

TASK NO: _____

DATE: _____

MACTEC CREW: _____

SAMPLER NAME: _____

SAMPLER SIGNATURE: _____

CHECKED BY: _____

DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

AM CALIBRATION

Start Time _____/End Time _____

Units

Standard Value

Meter Value

*Acceptance Criteria (AM)

pH (4)

SU

4.0

+/- 0.1 pH Units

pH (7)

SU

7.0

+/- 0.1 pH Units

pH (10)

SU

10.0

+/- 0.1 pH Units

Redox

+/- mV

240

+/- 10 mV

Conductivity

mS/cm

1.413

+/- 0.5 % of standard

DO (saturated)

%

100

+/- 2% of standard

DO (saturated)

mg/L¹ (see Chart 1)

+/- 0.2 mg/L

DO (<0.1)

mg/L

<0.1

< 0.5 mg/L

Temperature

°C

Baro. Press.

mmHg

POST CALIBRATION CHECK

Start Time _____/End Time _____

Standard Value

Meter Value

*Acceptance Criteria (PM)

7.0

+/- 0.3 pH Units

240

+/- 10 mV

1.413

+/- 5% of standard

+/- 0.5 mg/L of standard

TURBIDITY METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Units

Standard Value

Meter Value

<0.1 Standard

NTU

<0.1

20 Standard

NTU

20

100 Standard

NTU

100

800 Standard

NTU

800

Standard Value

Meter Value

*Acceptance Criteria (PM)

<0.1

+/- 0.3 NTU of stan.

20

+/- 5% of standard

100

+/- 5% of standard

800

+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Background

ppmv

<0.1

Span Gas

ppmv

100

<0.1

within 5 ppmv of BG

100

+/- 10% of standard

O₂-LEL 4 GAS METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

Methane

%

50

O₂

%

20.9

H₂S

ppmv

25

CO

ppmv

50

50

+/- 10% of standard

20.9

+/- 10% of standard

25

+/- 10% of standard

50

+/- 10% of standard

OTHER METER

METER TYPE _____

MODEL NO. _____

UNIT ID NO. _____

See Notes Below

for Additional

Information

☐

Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.

☐

Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: _____

Lot#/Date Produced: _____

Trip Blank Source: _____

Sample Preservatives Source: _____

Disposable Filter Type: _____

Calibration Fluids / Standard Source: _____

- DO Calibration Fluid (<0.1 mg/L)

- Other

- Other

- Other

Portland FOS

Laboratory provided

Laboratory provided

in-line 0.45µm cellulose

Portland FOS

Cal. Standard Lot Number

Exp. Date

pH (4)

pH (7)

pH (10)

ORP

Conductivity

<0.1 Turb. Stan.

20 Turb. Stan.

100 Turb. Stan.

800 Turb. Stan.

PID Span Gas

O₂-LEL Span Gas

Other

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additional acceptance criteria obtained from instrument specific manufacturer recommendations.

** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.

1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

EARTH ENVIRONMENT

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FIELD INSTRUMENT CALIBRATION RECORD