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August 21, 2024

Ms. Lyndsay Kresic
Iroquois Pipeline Operating Company
One Corporate Drive, Suite 600
Shelton, CT 06484

Subject: **Environmental Sampling at the Bronx Metering & Regulation Facility, Hunts Point, Bronx, New York**

At the request of Iroquois Pipeline Operating Company (Iroquois), AECOM Technical Services, Inc. (AECOM) is submitting this Work Plan outlining the rationale and field sampling methodology that will be implemented during the proposed soil and groundwater sampling at the Bronx Metering & Regulation Facility in Hunts Point, Bronx, New York (the site). The purpose of the proposed investigation is to characterize potential contamination and resulting disposal requirements along a proposed entrenchment area for future installation of a new pipeline.

OVERVIEW

Iroquois Hunts Point (the site) is located at 310 Halleck Street, Bronx, New York, 10474, USA. The site encompasses roughly 3.5 acres and is located on a small promontory formed by the confluence of the East and Bronx rivers with an approximate elevation between 10 and 20 feet above mean sea level. The site is currently occupied by a natural gas metering, regulation and compression station (M&R) with a fence surrounding the entirety of the property (Parsons 2004). The site includes only the eastern portion of the property and is accessible along Food Center Drive.

Between the 1924 and 1960s the site was part of the grounds of Con Edisons former Hunts Point Gas Works, a former manufactures gas plant (MGP). According to a final engineering report filed by Parsons in 2004, no MGP related structures were present on site, however several MGP related structures and a former Con Edison substation and associated structures were located adjacent to the property to the south of the site. To address former MGP related impacts prior to the current construction, remedial actions were conducted between April and May of 2003 that included installation of protective surface covers immediately following remedial excavation.

PROPOSED INVESTIGATION & SITE CHARACTERIZATION

The proposed sampling and analytical methodology is intended to identify the presence or absence of impacted soil and groundwater within the proposed pipeline trench, and characterization of material for future trenching and off-site disposal of excavated soil.

Scope of Work

The investigation will consist of the following:

- Installation of one monitoring well using direct push technology;
- Installation of three borings;
- Screen soil with a photoionization detector (PID);
- Collect environmental soil samples as appropriate;

- Logging of additional soil characteristics and
- Preform a slug test and sampling of groundwater.

Health and Safety

The proposed field investigation will be conducted under AECOM's existing Hunts Point Health and Safety Plan (HASP), which will be updated to incorporate this scope of work. The HASP will be updated to address potential physical and chemical hazards and will evaluate other site-specific health and safety considerations. Additionally, Task Hazard Analyses (THAs) will be prepared and/or updated to mitigate specifically identified hazards encountered within the scope of work. The HASP and THAs will be reviewed and approved by AECOM Health and Safety Management prior to commencement of field activities.

Underground Utility Clearance

Prior to advancing the proposed soil borings, the proposed boring locations will be field located using a hand-held Global Positioning System (GPS) locating device and will be marked with white paint and/or survey flags. AECOM will subcontract with GPRS, Inc. (GPRS) to perform a ground-penetrating radar (GPR) and electromagnetic induction (EMI) survey at each boring location to identify underground utilities and buried anomalies or obstructions within the work area. All utilities and subsurface structures identified will be marked by GPRS. AECOM will use existing information obtained from past site investigations, to the extent possible, during the survey. AECOM will also contact the New York Dig Safe (UDIG), as required by law, a minimum of 72 hours ahead of any planned subsurface disturbance to locate and mark the underground utilities in the vicinity of the proposed soil borings. If utilities are identified near any of the planned soil borings, these locations will be relocated within 5-10 feet of the initially selected location and the new location will be evaluated by GPRS. After GPR has been completed the boring locations will be pre-cleared to 5 feet below ground surface, via hang auguring, to confirm subsurface conditions to five feet.

Community Air Monitoring

Community air monitoring requires real-time monitoring for VOCs, particulates (i.e., dust), and petroleum related odors at the downwind perimeter of each designated work area when certain activities are in progress at the Site. The community air monitoring is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative work activities. The Community Air Monitoring Plan (CAMP) provided in Section 6 of the HASP specifies action levels which require increased monitoring, corrective actions to abate emissions, and/or work shutdown for the environmental sampling.

Soil Sampling and Field Methodology

AECOM will complete a total of three soil borings (SB-01 through SB-03) during this investigation. All boring locations will be hand augered to a minimum depth of 5 feet below ground surface (bgs). Soils removed during hand augering will be placed into plastic bags for logging and screening, as well as potential sampling as described below. The remaining depth of all soil borings will be completed using a direct-push technology (DPT) drill rig (such as Geoprobe© rigs) to obtain continuous sample recovery. Sampling will be conducted in 5-foot intervals with soil captured in plastic core liners.

Recovered soils will first be screened for total organic vapor (TOV) in the field using a calibrated photoionization detector (PID). The recovered soil will then be described by an AECOM Environmental Scientist/Geologist using the Unified Soil Classification System (USCS). The Environmental Scientist/Geologist will record lithology characteristics, PID responses to screened soils and ambient air, and any visible or olfactory evidence of impacts to the recovered soils on the boring log.

At locations where monitoring wells are proposed, borings will be advanced to at least 5 feet below the static water table (as encountered during boring installation), and to a minimum depth of 12 feet below grade (if groundwater is encountered at a depth shallower than 7 feet below grade). If probe refusal is encountered prior to reaching the target boring depth, one borehole offset approximately 5 feet from the original location will be attempted, up to two times.

One grab soil sample will be collected from each boring from the depth interval with the highest TOV reading or olfactory evidence of impacts and submitted for laboratory analysis. If no signs of impact (i.e., TOV reading, visible or olfactory evidence) are observed, a grab soil sample collected immediately above the water table will be submitted for laboratory analysis. In addition, two composite samples will be prepared using recovered soils from all borings for waste characterization analyses listed below.

Boring	Depth	Analysis and method
SB-1/MW-01	Highest total organic vapor reading or at water table	VOC 8260, SVOC, 8270SIM, RCRA Metals 6010/7471, TPH 8015B, PCB, 8082 and PFAS 1633
SB-2	Highest total organic vapor reading or at water table	VOC 8260, SVOC, 8270SIM, RCRA Metals 6010/7471, TPH 8015B, PCB, 8082 and PFAS 1633
SB-3	Highest total organic vapor reading or at water table	VOC 8260, SVOC, 8270SIM, RCRA Metals 6010/7471, TPH 8015B, PCB, 8082 and PFAS 1633
SB-4	Highest total organic vapor reading or at water table	VOC 8260, SVOC, 8270SIM, RCRA Metals 6010/7471, TPH 8015B, PCB, 8082 and PFAS 1633

PCB = Polychlorinated Biphenyls
PFAS = Per- and Polyfluoroalkyl Substances
RCRA = Resource Conservation & Recovery Act
SIM = selected ion monitoring
SVOC = Semi-volatile organic compounds
TPH = Total Petroleum Hydrocarbons
VOC = Volatile organic compounds

Groundwater Sampling and Slug Test and Field Methodology

One groundwater monitoring well (MW-01) will be installed during the investigation, using a Geoprobe track-mounted rig with direct push. A monitoring well consisting of a polyvinyl chloride PVC well screen and riser will be installed.

The monitoring well consisting of a polyvinyl chloride (PVC) well screen and riser will be installed in one location. Although the well is intended to have a short-duration installation, temporary wellpoints are not recommended for use in sampling when the potential entrainment of solids in water samples may be problematic and/or when geophysical testing (such as falling or rising head tests) is proposed. The well will be constructed of 2-inch diameter (minimum) PVC slotted screen and riser sections, set in 4-inch diameter (minimum) well pack consisting of well-graded sand. A minimum one-foot-thick bentonite seal will be placed around the annulus above the well pack. Monitoring wells will be screened with five-to-ten-foot 10 slot PVC screens. The maximum depth of the wells will be 18 feet bgs. The monitoring well will be finished off with a roadbox.

Following installation, the monitoring well will be developed to evacuate silts and other fine-grained sediments which may have accumulated within the well during its installation. Well development will not be performed for a minimum of 12 hours after well installation. A number of techniques may be used, including surging using a plunger, bailing or pumping until the turbidity has stabilized (less than 50 NTU if possible). Special care will be taken to develop the wells properly in order to ensure adequate hydraulic connection between the monitor well and the aquifer and to obtain representative groundwater samples for chemical analysis.

One groundwater sample will be collected from the monitoring well and submitted for laboratory analysis as described below. To allow for potential use of this data in an application for a New York City Department of Environmental Protection (NYCDEP) dewatering discharge permit, the groundwater sample analytical methods have been determined in accordance with NYCDEP requirements.

The general steps to be performed during slug testing are as follows:

- Static water level will be measured to the nearest 0.01 foot.
- A pressure transducer, attached to a data logger, will be placed into the well and the water level allowed to equilibrate to static conditions.
- A weighted slug will be inserted into the well, below the water table while simultaneously measuring and recording water levels with the pressure transducer and data logger until the water level has equilibrated ("slug in test").
- The slug will then be withdrawn from the well and the water level will be measured and recorded ("slug out test").

- Groundwater Sample:
  - VOCs by EPA Method 624;
  - SVOCs by EPA Method 625;
  - Oil and grease (non-polar material) by EPA Method 1664;
  - PCBs by EPA Method 608 with a method detection limit of 65 nanograms per liter or lower;
  - Metals and mercury by EPA Methods 200.7, 200.8 and/or 245.1 as appropriate to the analyte;
  - Hexavalent chromium by Methods I1230 or 3500CR-B;
  - Flash point by EPA methods 1010A or 1020B;
  - Total solids and total suspended solids by Standard Method 2540;
  - Carbonaceous biological oxygen demand (5-day) by Standard Method 5210;
  - Chloride by EPA Method 300.0; and
  - Total Kjeldahl Nitrogen nitrite and nitrate with methods 4500-N, and 300.0.

Investigation Derived Waste

Soil and fluids generating during field activities will be handled as investigation-derived waste (IDW). IDW will be placed in labeled 55-gallon Department of Transportation (DOT)-rated drums, sampled for disposal characterization at the completion of all work (as detailed below), and temporarily stored on-Site for disposal. Once the waste characterization sample data are received and confirmed, AECOM will subcontract with an appropriate waste disposal or recycling contractor. For costing purposes, the soil and fluids are assumed to be non-hazardous and no more than two drums of soil cuttings and two drums of aqueous wastes will be generated.

All reusable sampling tools will be decontaminated between uses as appropriate by washing with a non-phosphate detergent solution, rinsing with potable water, and air drying. Disposable sampling equipment and personal protective equipment will be used once, as applicable per sample or boring, and then disposed as solid waste in an on-site receptacle. Waste characterization samples will be analyzed as follows:

Borings	Media	Analysis and method
SB-2, SB-3, and SB-4	Soil	TCLP Pesticide 8081B, TCLP Herbicide 8151A, TCLP Metals 6010D/74740A, TCLP SVOC 8270E, TCLP VOC 8260D, % Solids SM 2540G, Reactive Sulfide SW846 7.3, Ignitability, 1030, Corrosivity 150, Reactive Cyanide, PFAS 1633
*MW-01/SB-1	Soil	TCLP Pesticide 8081B, TCLP Herbicide 8151A, TCLP Metals 6010D/74740A, TCLP SVOC 8270E, TCLP VOC 8260D, % Solids SM 2540G, Reactive Sulfide SW846 7.3, Ignitability, 1030, Corrosivity 150, Reactive Cyanide, PFAS 1633
MW-01	Water	TCLP Pesticide 8081B, TCLP Herbicide 8151A, TCLP Metals 6010D/74740A, TCLP SVOC 8270E, TCLP VOC 8260D, Reactive Sulfide SW846 7.3, Ignitability, 1030, Corrosivity 150, Reactive Cyanide, PFAS 1633

PCB = Polychlorinated Biphenyls
RCRA = Resource Conservation & Recovery Act
SIM = selected ion monitoring
VOC = Volatile organic compounds
PFAS = Per- and Polyfluoroalkyl Substances
SVOC = Semi-volatile organic compounds
TCLP = toxicity characteristic leaching procedure.

*The soil from MW-01/SB-1 is associated with a different project than those of SB-2, SB-3 and SB-4 therefore a separate soil waste characterization sample will be collected.

Quality Control

One trip blank will be analyzed for VOC for soil and one for water. A duplicate sample per media will also be analyzed. The laboratory QA program for sample analysis will include the appropriate surrogate recoveries and analysis of method blanks, matrix spikes, matrix spike duplicates at an appropriate frequency in conformance with standard industry practices. Data will not be validated.

REPORTING

Once all laboratory results are received, AECOM will prepare a letter report summarizing the environmental sampling activities, results, and findings. The report will contain the following:

- A narrative describing field activities and sampling results.
- Tables showing a summary of field data and the analytical results with comparisons to the current Federal and State action levels as well as Site specific historic analytical data.
- An estimated dewatering rate necessary to maintain dry excavations for two excavation scenarios (as defined by the horizontal dimensions and total depth of the excavations below the groundwater table).
- A summary of findings and conclusions.
- Appendices for figures, boring logs, photographs, and laboratory analytical reports.

CLOSING

If you have questions regarding this work plan, please call. Eleanor Vivaudou of AECOM at (914) 227-3942, or Robert Forstner at (917) 597-3866.

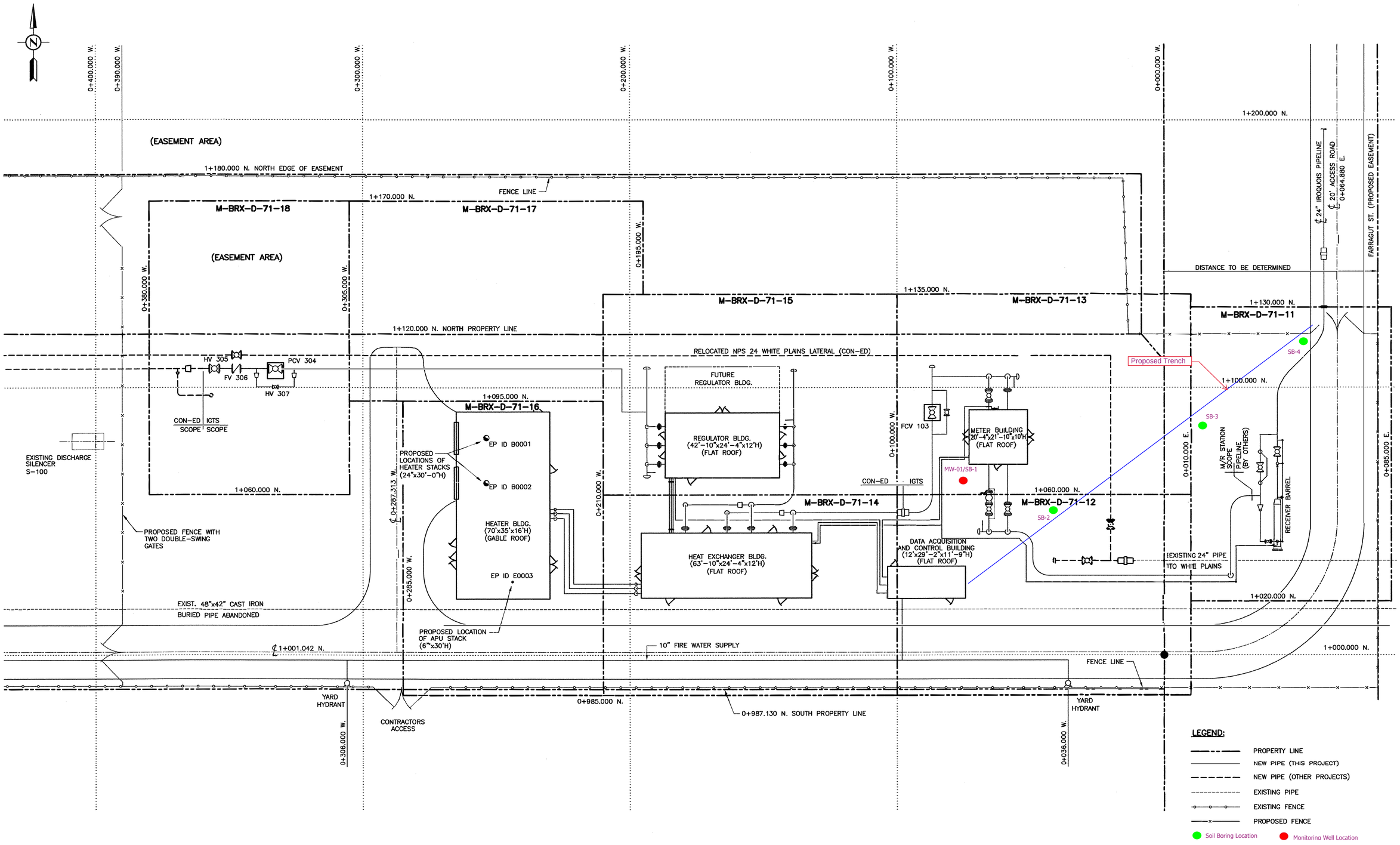
Sincerely,

Eleanor Vivaudou, P.E.
Project Manager

Robert Forstner, P.E.
Senior Engineer

Enclosures: Figure 1 Sample Location Plan

FIGURES



REFERENCE DRAWINGS	
DRAWING NO.	TITLE

PERMIT

ENGINEER'S STAMP

STATE OF NEW YORK — BRUCE ROBERT HORNE — No. 077693 — LICENSED PROFESSIONAL ENGINEER

8/2/04

Stone & Webster Engineering New York, P.C.

REVISIONS						
REV.	DATE	DESCRIPTION	BY	CHK'D	ENG	APP
0	09.06.02	ISSUED FOR BID EASTCHESTER EXTENSION PROJECT	JCM			GRW
1	09.16.02	RE-ISSUED FOR BID EASTCHESTER EXTENSION PROJECT	JPG			GRW
2	10.04.02	REVISED AND RE-ISSUED FOR BID EASTCHESTER EXTENSION PROJECT	JPG			GRW
3	11.15.02	ISSUED FOR CONSTRUCTION EASTCHESTER EXTENSION PROJECT	JPG	ZR		GRW
4	12.17.02	RE-ISSUED FOR CONSTRUCTION EASTCHESTER EXTENSION PROJECT	JPG	GW	BR	GW
5	02.01.03	PLACED DOUBLE DOORS ON HEATER BUILDING EASTCHESTER EXTENSION PROJECT	DCK	GW		GRW
6	05.28.04	AS-BUILT EASTCHESTER EXTENSION PROJECT	MG	GW	BR	GRW

Stone & Webster Engineering New York, P.C.

Cimarron Engineering Ltd.

Iroquois GAS TRANSMISSION SYSTEM — IROQUOIS PIPELINE OPERATING COMPANY, OPERATOR

APPROVED BY:

ENGINEERING MANAGER

DRAWN BY	JPG	DATE	12.17.02
CHECKED BY	GW	DATE	12.18.02
DRAFT. SUP.	CC	DATE	12.17.02
ENGR.	BR	DATE	12.20.02
AFE#		VALVE SECTION	
FILE NO.	M-BRX-D-71-01	SCALE	1/16"=1'

SAMPLE LOCATION PLAN
Figure 1

BRONX METERING & REGULATING FACILITY

BRONX BOROUGH, NEW YORK CITY, NEW YORK

DWG. NO.: M-BRX-D-71-01 — REVISION 6

Universal Health & Safety Plan

Iroquois Hunts Point
310 Halleck Street
Bronx, New York, 10474, USA
USA

Prepared For:

Client Name:	Iroquois Pipeline Operating Company
Client Address:	One Corporate Drive, Suite 600, Shelton, CT 06484
Project #:	60731451

Prepared By:

AECOM
605 3rd Avenue, New York, NY 10158

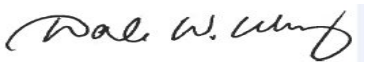
Preparer:

Name: Ibrahim Salem
Title: Geologist I
Date Prepared: July 5, 2024

Signature

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

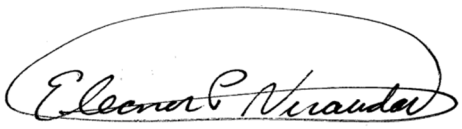
Name: Dale “Pete” Wray, CSP, CHMM, STS
Title: SH&E Manager, AME ENV U.S. East
Date Reviewed: August 23, 2024



Signature

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

Name: Eleanor Vivaudou
Title: Sr. Project Manager/Engineer
Date Approved: August 23, 2024



Signature

Expiration:	**August 23, 2025**	Valid for one (1) year maximum or until the scope of work, subcontractor(s), methods and/or equipment change.

Table of Contents

Attachments

1. HASP Summary Contact Information

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

	Nearest Resource	Name and Address	Hours of Operation	Phone #
Medical Treatment Resources	**Clinic**	Centers Urgent Care of Hunts Point 925 Hunts Point Ave, Bronx, NY 10459	8AM-8PM	(717) 502-3910
	Hospital	Lincoln Medical Center 234 E 149th St, Bronx, NY 10451	24 Hours	(717) 579-5784
	First Aid Providers	Call 911		911
	Nurse	**1-512-419-5016** – 24 HOURS PER DAY | 7 DAYS PER WEEK The hotline Operator will transfer injured/ill EE to nurse. If the transfer fails or EE's condition worsens following initial consultation, call direct.		
	Site Emergency Response	**911**		

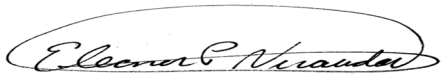
	Level	Title	Name	Phone #
Key Personnel	**Project Level**	**Project Manager (PM):**	Eleanor Vivaudou	(914) 227-3942
		Site Supervisor (SS):	TJ Malgieri	(845) 406-2766
		Site Safety Officer (SSO):	TJ Malgieri	(845) 406-2766
		Client Contact Person:	Lyndsay Kresic	(203) 944-7019
		Area/Business Line SH&E Manager:	Pete Wray	(302) 660-9178
		Regional SH&E Director:	Tony Indorato	(757) 298-1563

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

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

Contractual Requirements for Safety, Health, and the Environment

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

Eleanor Vivaudou		August 23, 2024
Project Manager Name	Project Manager Signature	Date

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

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

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

☐ Other/Additional Details: N/A

2. Introduction

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

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

2.1 Applicable References

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

- Federal Occupational Safety and Health Administration (OSHA) Code of Federal Regulation Title 29, Part 1910 (29 CFR Part 1910), Safety and Health Regulations for General Industry and 29 CFR 1926, Safety and Health Regulations for Construction.
- Title 8 of the California Code of Regulations (8 CCR), with special attention to Section 5192 Hazardous Waste Operations and Emergency Response, and Section 3202, Injury Illness Prevention Program and to Sub Chapter 4, Sections 1500 - 1938 Construction Safety Orders.
- National Institute for Occupational Safety and Health/Occupational Safety and Hazards Administration/U.S. Coast Guard/U.S. Environmental Protection Agency, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.
- The requirements in this HASP also conform to AECOM's Safety for Life Program requirements as specified in the AECOM Global Safety, Health, and Environment (SH&E) System Management Manual.

3. Verbal Incident Notifications

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

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

3.1 Incidents

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

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

Significant Incident:

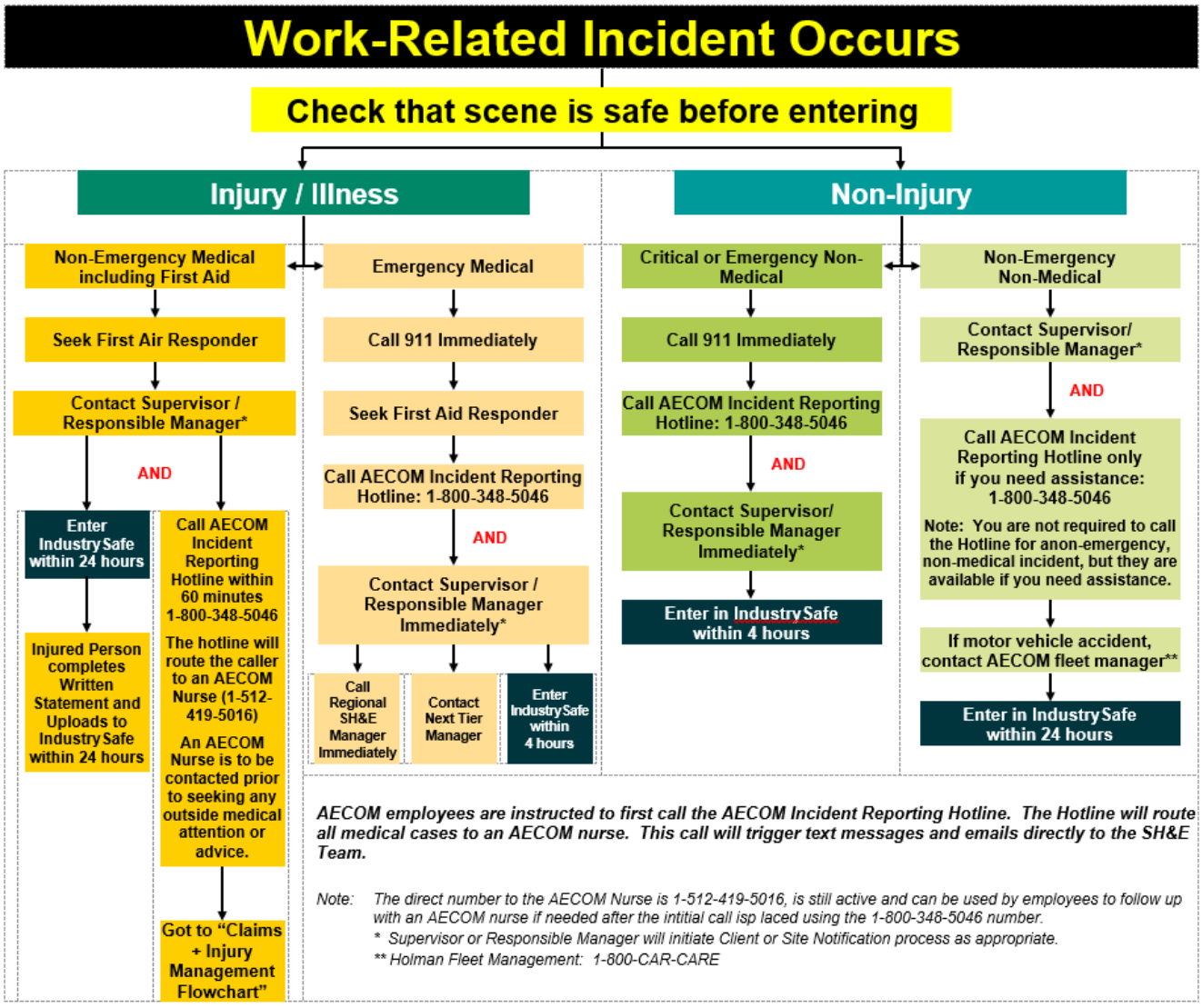
- Fatality;
- Amputation;
- Hospitalization for treatment for more than 24 hours (admission);
- Any single event resulting in more than one employee requiring medical treatment or being away from work more than 3 days;
- Any SHE-related Consent Agreement/Order/Lawsuit or enforcement action seeking more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

All Other Incidents:

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

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

Table 3-1: Incident Notification & Reporting Flow Chart



3.2 AECOM Internal Notifications

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

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

3.3 Client Specific Notifications

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

4. Emergency Response Plan

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

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

4.1 Directions and Maps to Nearest Medical Treatment Resources

See following pages for directions and maps.

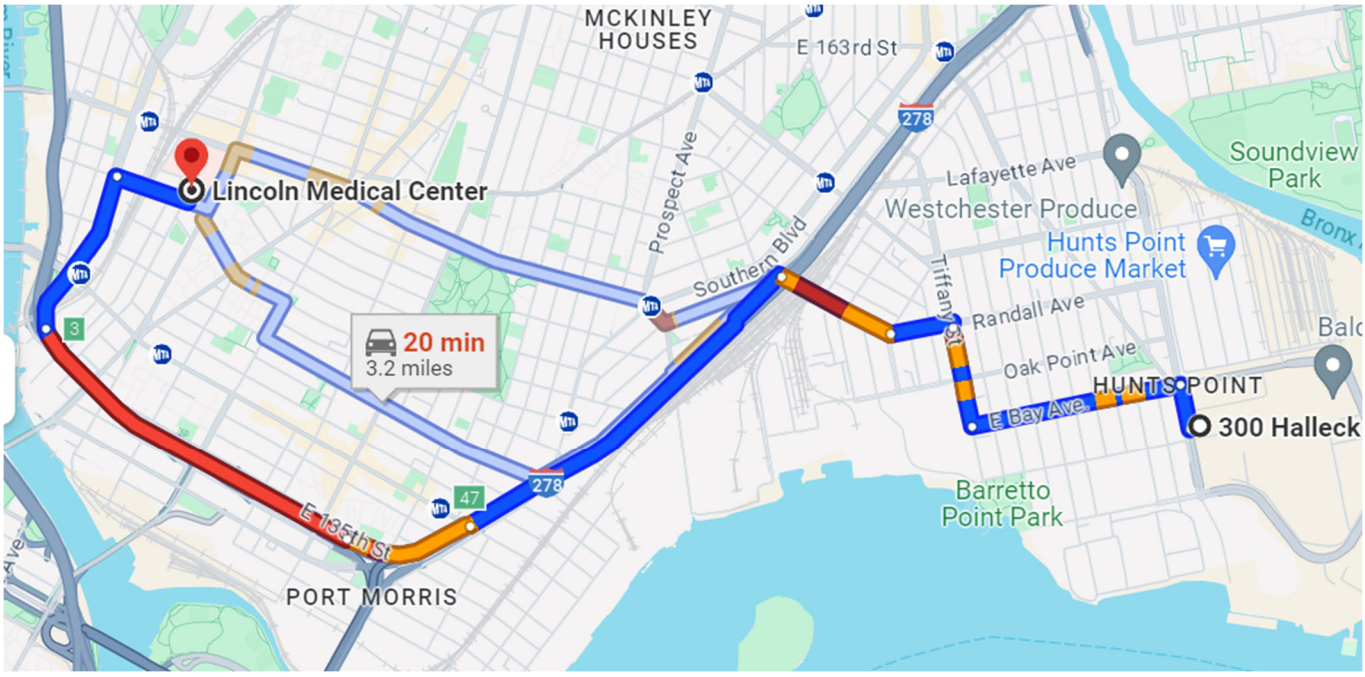
NEAREST HOSPITAL

Lincoln Medical Center			**(718) 579-5000**
Address:	234 East 149th Street, Bronx, NY 10451		
Hours of Operation:	24 Hours		
Travel Time:	15 Minutes	**Travel Distance:**	4.0 Miles

DRIVING DIRECTIONS TO HOSPITAL

1. From Site, Turn right onto Halleck Street and head North for 0.1 miles.
2. Turn left onto East Bay Avenue and head east for 0.5 miles.
3. Turn right onto Tiffany Street and head north for 0.2 miles.
4. Turn left onto Randall Avenue and head east/northeast for 0.2 miles.
5. Continue straight onto Arlington Leon Eastmond, Sr. Way for 0.3 miles.
6. Turn left and merge onto I-278 West for 1.0 mile.
7. Continue onto I-87 North for 1.2 miles.
8. Take exit 3 to merge onto Grand Concourse.
9. Turn right onto East 144th Street.
10. Arrive at Hospital on the left.

ROUTE MAP TO HOSPITAL



NEAREST OCCUPATIONAL CLINIC

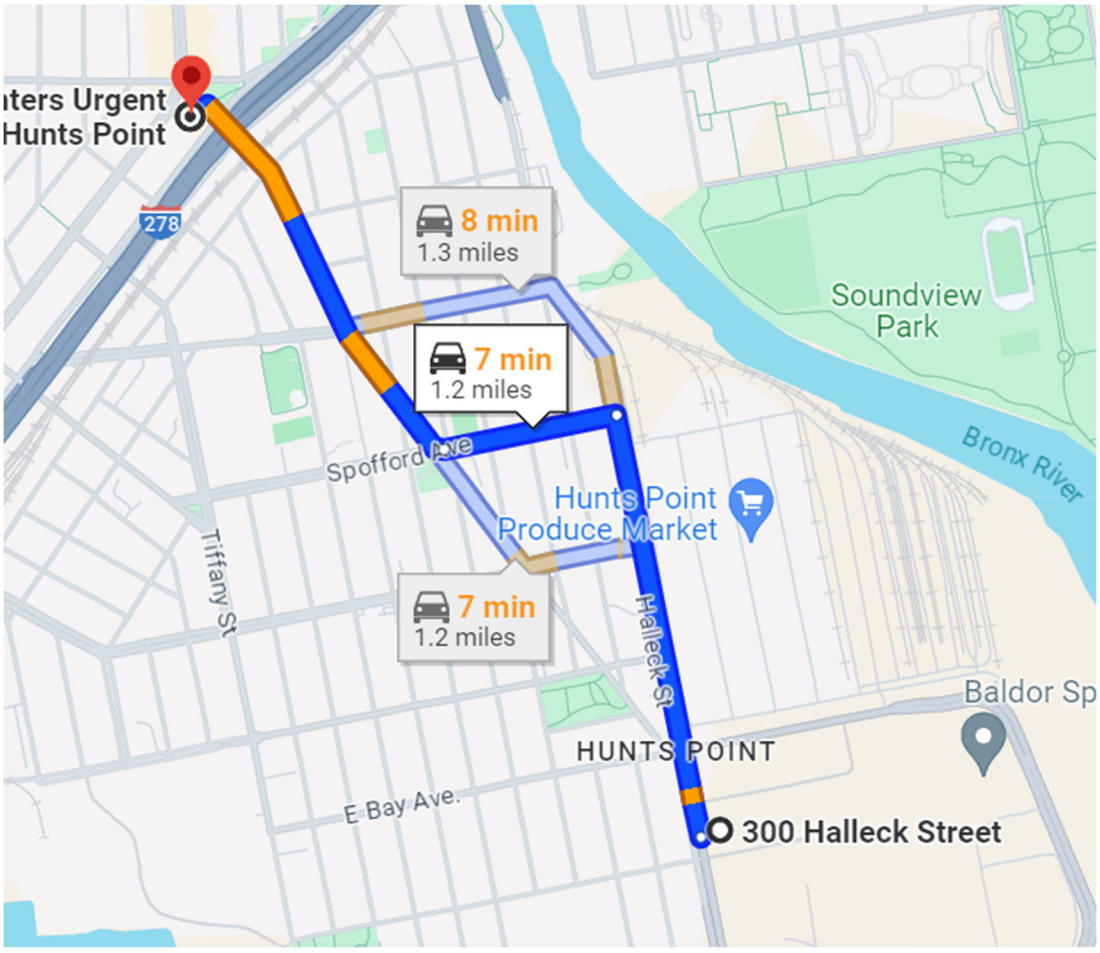
Centers Urgent Care **(718) 502-3910**

Address:	925 Hunts Point Avenue, Bronx, NY 10459		
Hours of Operation:	8:00 am to 8:00 pm		
Travel Time:	5 Minutes	**Travel Distance:**	1.2 Miles

DRIVING DIRECTIONS TO OCCUPATIONAL CLINIC

1. From Site, Turn right onto Halleck Street and head North for 0.5 miles.
2. Turn left onto Spofford Avenue and head East for 0.2 miles.
3. Turn right onto Hunts Point Avenue and head north for 0.5 miles
4. Arrive at the Clinic on the left.

ROUTE MAP TO OCCUPATIONAL CLINIC



4.2 Emergency Planning

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

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

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

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

Muster Location Type	Location Description
Primary:	■ Northeastern exit of site along Food Center Drive
Alternate:	● Gate to Con Edsion Property
Shelter-In-Place:	♦ Within vehicles on site.

Muster Locations and Evacuation Route Map

Table 4-3: Site Emergency Equipment and Its Location

ITEM(S)	ITEM DESCRIPTION	LOCATION(S)
First Aid Kit(s)	■ ANSI Z308.1 Class A, Type III; Qty=1 ■ ANSI Z308.1 Class B, Type III; Qty=1	■ AECOM Field Vehicle
Automated External Defibrillator(s) (AEDs)	■ Standard AED	■ n/a
Fire Extinguisher(s)	■ 2A:10: B:C (5 lb. ABC) ■ 4A:80B:C (10 lb. ABC) ■ 4A:80B:C (10 lb. ABC) ■ 8A:120b:C: (20 lb. ABC)	■ AECOM Fleet Vehicle(s) ■ Drill Rig/Geoprobe ■ Heavy Equipment Cabins(s) ■ Hot Work Area(s)
Spill Kit(s)	■ Oil	■ Rig
Satellite Phone(s)	■ Describe	■ Describe
Rescue Equipment	■ Describe	■ Describe
Wildlife Deterrent(s)	■ Describe	■ Describe
Emergency Shelter(s)	■ Describe	■ Describe
Emergency Ration(s)	■ Describe	■ Describe
Personal Locating Device(s)	■ Describe	■ Describe
Cold/Heat Stress Aids	■ Climate-Controlled Environment ■ Other (specify)	■ Field Vehicle(s) ■ Location

4.3 Potential Emergency Scenarios

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

4.3.1 Evacuation

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

4.3.2 Medical Emergency

1. Stop the work activity.
2. Assess the cause of the injury to avoid injury to yourself (i.e. live wires, gases, hazardous materials).

3. Do not move the casualty unless they remain in danger.
4. First Aid Provider will designate an individual to call for medical assistance (e.g., ambulance, site medic).
5. First Aid Provider will designate an individual to retrieve the first aid kit and blankets.
6. Request assistance from other First Aid Providers as necessary. Administer first aid:
    a) Assess responsiveness: ask permission.
    b) Send for medical help.
    c) Place casualty/victim face up.
    d) Check Airway, Breathing and Circulation ABC's
    e) Control severe bleeding.
7. If CPR is deemed necessary:
    a) Begin chest compressions at a rate of at least 100 compressions per minute.
    b) CPR shall be continued until:
        i. until an AED is applied,
        ii. casualty begins to respond,
        iii. another first aid provider takes over,
        iv. medical help takes over, or
        v. physically unable to continue.
8. If the casualty begins to breathe on their own, place them in the recovery position, monitor and treat for shock as appropriate.
9. Individual in communication with the designated medical assistance shall attempt to answer any questions, stay on the line until information is verified and follow instruction.
10. Arrange for medical transport as needed. A designated individual should be positioned to direct medical transport to the casualty.
11. Personnel shall await further instruction from the Site Supervisor, Site Safety Officer, or designate (e.g., resume activity).

4.3.3 Lightning/Weather-Related Emergencies

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

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

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

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

If a person is struck by lightning:

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

4.3.4 Vehicle Incidents

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

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

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

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

4.3.5 Fire

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

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

4.3.6 Other

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

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

ELECTRICAL LIVE LINE CONTACT

1. All personnel shall evacuate to the designated muster point if safely able to do so.
2. Establish the danger zone: 33ft (10m) radius from anything in contact with the live line.
3. If contact was made while operating a vehicle or equipment, the operator shall, if feasible:
    a) Remain on the equipment or inside the cab. All other personnel must keep away from the machine and any other applicable connected or contacted components such as rope or load.
    b) Try, unaided and without anyone approaching the machine, to back off the equipment until it is well clear of the power line.
    c) If the machine cannot be self-propelled away or disentangled from the line, remain inside the machine until the electrical authorities de-energize the circuit and confirm that conditions are safe.
    d) If the cable or equipment appears to be welded to the line do not try to back the equipment off. This could cause the line to whip or snap.
4. If hazards are present, such as fire, that require the operator to leave the equipment or vehicle, the operator must jump to the ground, taking critical care to keep both feet together and not fall or touch the equipment or ground with any other body part.
5. To leave the danger zone the individual must ***Hydro Shuffle** or bunny hop with both feet leaving and making contact with the ground at the same time. Hopping shall be the secondary choice as the potential to fall is increased.
6. Notify Site Supervisor, Site Safety Officer, or designate.
7. Contact electrical company.
8. Assess the scene. Lock out power supply if it is possible to do so safely. Identify potential hazards: fire, explosion, slack lines away from immediate area.
9. Take appropriate control measures to prevent further hazards if it is safe to do so.
10. Should it be determined that a worker is still within the hazard zone, establish whether a rescue can be safely attempted. Follow **Emergency Rescue Procedure** if a rescue attempt will not put another life in danger.
11. Ensure any piece of equipment that has sustained a live line contact is inspected and/or receives appropriate certifications as damage to bearings or structural integrity may have occurred.

EXPLOSION

1. Fall to the ground and take immediate shelter under tables, desks (if outside take shelter behind/under trees, trailers) or other objects that will offer protection against flying debris. Protect your face and head with your arms.
2. After the effects have subsided, activate the alarm system, and call 911 and/or site emergency responders.
3. Evacuate the building or site, following the Evacuation Procedure.

GAS LEAK

Gas Odor or Major Leak:

1. Leave the area immediately.
2. Sound the alarm or ensure applicable notification system is initiated.
3. All personnel will vacate the building or site and proceed to the Muster Point.
4. Notify the appropriate authorities (e.g. utility owner emergency line, client) and supervisor, manager, or SH&E representative.
5. If gas is burning call the local fire department, call 911 or notify site fire responders. Give directions to the location; stay on the line until information is verified.
6. Restrict ignition sources from the area (e.g. electrical devices, engines, smoking, etc.).
7. Warn others in the area.
8. Provide responding utility and emergency personnel with any relevant information.
9. Personnel shall await further instructions from the Site Supervisor, Site Safety Officer, or designate (i.e. all clear and re-entry or further evacuation).

SPILL / LEAK / RELEASE OF HAZARDOUS MATERIALS

1. Identify the product and assess the risk of injury, fire, or explosion.

2. If there is insufficient information on the product or inadequate PPE, move upwind if possible and leave the area immediately (initiate personnel evacuation if required).
3. Isolate the area and deny access to any unauthorized personnel.
4. Only if safe to do so, take measures to stop and control the spill / leak / release
5. Eliminate all ignition sources, if required (no smoking, flares, sparks / flames, engines running).
6. As applicable, designate an individual to notify the Site Supervisor, Site Safety Officer, or designee will complete the appropriate incident notifications., or Foreman and SH&E representative.
7. Consult the product SDS for accidental release / handling procedures.
8. If it is not possible to stop / control the release, call the appropriate onsite or offsite emergency services.
9. Tend to any injured personnel (follow Medical Emergency steps).
10. Personnel shall await further instruction from the Site Supervisor, Site Safety Officer, or designate (e.g., further evacuation or resume activity).

4.4 Fitness for Duty and Illness Reporting

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

5. Site Description

The Site, Iroquois Hunts Point, is located at 310 Halleck Street, Bronx, New York, 10474, USA. The site encompasses roughly 3.5 acres and is located on a small promontory formed by the confluence of the East and Bronx rivers with an approximate elevation between 10 and 20 feet above sea level. The site is currently occupied by a natural gas metering, regulation and compression station (M&R) with a fence surrounding the entirety of the property. (Parsons 2004) The site includes only the eastern portion of the property and is accessible along Food Center Drive.

5.1 Site Background/History

Between the 1924 and 1960s the site was part of the grounds of Con Edisons former Hunts Point Gas Works, a former manufactures gas plant (MGP). According to a final engineering report filed by Parsons in 2004, no MGP related structures were present on site, however several MGP related structures and a former Con Edison substation and associated structures were located adjacent to the property to the south of the site. To address former MGP related impacts prior to the current construction, remedial actions were conducted between April and May of 2003 that included: installation of protective surface covers immediately following remedial excavation.

5.2 Client and/or Third-Party Operations at Site

Currently the site operates as a Con Edison natural gas metering, regulation and compression station. The site is located adjacent to a well known food distribution area of the of Hunts Point known as the Hunts Point Cooperative market to its south and general industrial buildings to its north, east and west. Commercial and residential vehicle traffic can often times be busy within the area.

5.3 Scope of Work

- 1. GPR: AECOM will subcontract a third-party utility locator to perform GPR prior to ground intrusive activities.
- 2. Boreholes: Soil borings will be installed at four locations across the site. Four locations will be in work areas where planned excavations are not expected to encounter groundwater. Three locations will be in areas where planned excavations are expected to extend below the water table. Monitoring wells will be installed at these locations for the purpose of characterizing groundwater quality as required for dewatering discharge permit approvals. Soil at all locations will be characterized for waste management purposes and construction-phase health and safety considerations.
- 3. Monitoring Well Installation: A monitoring well consisting of a PVC well screen and riser will be installed in one location. The Well will be constructed of 2-inch diameter (minimum) PVC slotted screen and riser sections, set in 4-inch diameter (minimum) well pack consisting of well-graded sand. A minimum one-foot-thick bentonite seal will be placed around the annulus above the well pack. The monitoring well will be developed not less than 24 hours after installation and will not be sampled less than 24 hours after development is completed.
- 4. Monitoring Well Sampling: One groundwater sample will be collected from each of the monitoring wells and submitted for laboratory analysis as described in the work plan.
- 5. Slug Testing: Falling and rising head tests will be conducted at each well following the completion of the soil boring activities.

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

Table 5-1: Task List

Task Name	Permit(s) Required		Primary Task Performed By		
			AECOM	SUB	Third-Party
Driving To and From the Site	☐ Yes	☒ No	☒	☒	☐
Drilling, Grouting, Monitoring Wells	☐ Yes	☒ No	☐	☒	☐
Slug Testing	☐ Yes	☒ No	☒	☐	☐
Hand and Power Tools	☐ Yes	☒ No	☒	☒	☐
Load and Unload Vehicle	☐ Yes	☒ No	☒	☒	☐
	☐ Yes	☐ No	☐	☐	☐

5.4 Key Dates

Project Start Date:	June 3, 2024
Field Work Start Date:	September 3, 2024
Project Completion Date:	January 31, 2025

5.5 Physical and Biological Hazards

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

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

Some tasks are considered High Potential (HiPo) Hazard Activities as identified in S3AM-209-PR1, Risk Assessment, based on the factors contributing to the severity and probability of credible outcomes resulting from ineffective mitigation of their hazards and are designated with "**HH**" in the table below. High potential hazard activities typically require additional documents such as a Safe Work Permit (S3AM-218-FM1), activity-specific permit, site specific plans, task/equipment-specific training, pre-use inspections, a competent person, etc. ADT

All checked procedures MUST be included in **Attachment B** for implementation and reference. The following hazards and their site-specific description are anticipated based on the scope of work and project site: **Check all boxes applicable to this scope of work.**

Table 5-2: Anticipated Activities, Situations and Physical & Biological Hazards

Activity / Situation / Physical or Biological Hazard		Applicable SH&E Procedure(s)	Related Activity-Specific Permit or Plan (Typically Required)
☒ **Cold Stress**		S3AM-112-PR1	n/a
☒ **Drilling, Boring & Direct Push Probing**	HH	S3AM-321-PR1	n/a
☒ **Driving**		S3AM-005-PR1	S3AM-005-FM1
☒ **Hand and Power Tools (drill, chainsaw, grinder, power saw, pressure washer, etc.)**	HH	S3AM-305-PR1	n/a
☒ **Hand Hazards**		S3AM-317-PR1	n/a
☒ **Heat Stress**		S3AM-113-PR1	S4DCS-AM-113-FM1
☒ **Heavy Equipment**	HH	S3AM-309-PR1	S3AM-218-FM1

Table 5-2: Anticipated Activities, Situations and Physical & Biological Hazards

Activity / Situation / Physical or Biological Hazard		Applicable SH&E Procedure(s)	Related Activity-Specific Permit or Plan (Typically Required)
☒ **Hot Work**	HH	S3AM-332-PR1	S3AM-332-FM1
☒ **Manual Lifting**		S3AM-014-PR1	n/a
☒ **Newly Hired or Transferred Employees**	HH	S3AM-015-PR1	n/a
☒ **Non Ionizing Radiation**		S3AM-121-PR1	n/a
☒ **Overhead Lines and Obstructions**	HH	S3AM-322-PR1	S3AM-218-FM1
☒ **Underground Utilities**	HH	S3AM-331-PR1	S3AM-331-FM1
☒ **Wildlife, Plants, and Insects**		S3AM-313-PR1	n/a

Note: **HH –** High-Hazard Activity or Situation

5.5.1 Competent Persons

A competent person is an employee who, through education, training, and experience, has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. AECOM's Competent Person Designation Procedure, S3AM-202-PR1, explains the roles, responsibilities and procedures of naming a competent person.

Table 5-3: Competent Person Log

☒ Scope of Work requires one or more competent persons (see table below)
☐ None, Scope of Work does not require competent persons(s).

	Activity / Area of Competency	Name of Person (Affiliation) Note: Subcontractors may provide this person
☒	**Hearing Protection**	■ TBD ADT
☒	**Heavy Equipment**	■ TBD ADT2

5.6 Chemical & Airborne Hazards/ Constituents of Concern

Airborne and chemical hazards are types of occupational hazards caused by workplace exposures. Exposure to airborne materials and chemicals in the workplace can cause acute or long-term detrimental health effects. Potential exposure to these hazards on AECOM projects can come from several sources including materials brought on site to perform work, constituents of concern found in environmental media under investigation, and simultaneous operations being performed at the site by the property owner/third parties.

Based on information obtained from historical investigations and other sources, the chemicals in the table below are known or suspected to be present at the site.

Table 5-4: Summary of Hazardous Properties of Chemical and Airborne Hazards

***Notes: PEL** = Permissible Exposure Limit | **TLV** = Threshold Limit Value | **IP** = Ionization Potential | **eV** = Electron Volt*

Chemical Name	Media	Primary Routes of Exposure	PEL	TLV	IP (eV)
Metals					

Table 5-4: Summary of Hazardous Properties of Chemical and Airborne Hazards

***Notes: PEL** = Permissible Exposure Limit | **TLV** = Threshold Limit Value | **IP** = Ionization Potential | **eV** = Electron Volt*

Chemical Name	Media	Primary Routes of Exposure	PEL	TLV	IP (eV)
Chromium VI	☐ Soil ☒ Groundwater ☐ Vapor	Dermal	0.005 mg/m^3	0.005 mg/m^3	n/a
Mercury	☐ Soil ☒ Groundwater ☐ Vapor	Dermal	0.1 mg/m^3	0.025 mg/m^3	n/a
Per- and Polyfluoroalkyl Substances (PFAS)					
Perfluorooctanoic Acid (PFOA)	☐ Soil ☒ Groundwater ☐ Vapor	Ingestion	n/a	1 mg/m^3	n/a
Perfluoro isobutylene (PFIB)	☐ Soil ☒ Groundwater ☐ Vapor	Ingestion	n/a	0.01 ppm [C]	n/a
Perfluoro butyl Ethylene	☐ Soil ☒ Groundwater ☐ Vapor	Ingestion	n/a	100 ppm	n/a
Other Common Site COCs					
Gasoline (TPH-GRO)	☒ Soil ☐ Groundwater ☐ Vapor	Inhalation	n/a	300 ppm	n/a
Oils (TPH-LRO)	☒ Soil ☒ Groundwater ☐ Vapor	Inhalation	5 mg/m^3 [b]	5 mg/m^3 [b]	n/a
Polychlorinated biphenyls (PCBs)	☒ Soil ☒ Groundwater ☐ Vapor	Absorption, ingestion	1 mg/m^3 (42% chlorine); 0.5 mg/m^3 (54% chlorine)	1 mg/m^3 (42% chlorine); 0.5 mg/m^3 (54% chlorine)	n/a

6. Air Monitoring

Potential exposure to chemical hazards from sources including materials brought on site to perform work, constituents of concern found in environmental media under investigation, and/or simultaneous operations being performed at the site by the property owner/third parties are reasonably anticipated to have the potential to result in vapors, fumes, aerosols, mists, and/or airborne particulates/dusts at or near permissible exposure limits. Therefore, air monitoring that will be implemented is described below.

6.1 Community Air Monitoring Plan

Real-time air monitoring for volatile compounds and particulates at the perimeter of the work area will be performed.

- VOCs will be monitored at the downwind perimeter of the work area if total organic vapors in the worker breathing zone exceed 5 ppm above background, or at least twice every hour. Monitoring will be conducted with a PID equipped with a 10.2 or 10.6 eV lamp. If total organic vapor levels exceed 1 ppm above background at the perimeter, excavation activities must be halted and monitoring continued. All readings must be recorded and be available for State (NYSDEC & NYSDOH) personnel to review.
- If dust becomes a concern, particulates will be monitored downwind of the work area with a portable particulate monitor that will have an alarm set at 150 mg/m^3. Background particulate levels will be established at the start of work. If downwind particulate levels, integrated over a period of 15 minutes, exceed 150 mg/m^3, then particulate levels upwind of the survey or work site will be measured. If the downwind particulate level is more than 100 mg/m^3 greater than the upwind particulate level, then excavation activities will be stopped and dust suppression techniques will be employed. Activities will also cease and corrective action will be taken if particulate levels exceed 2.5 times the background particulate level. All readings must be recorded and be available for review by the NYSDEC and/or NYSDOH. These action levels will be modified if particulates are better characterized and identified.

6.1.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 1 ppm above background at the perimeter of the work area, drilling activities will be halted or odor controls will be employed, and monitoring continued. If the organic vapor level decreases below 1 ppm above background, excavation activities can resume provided:

- The organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 1 ppm over background; and
- More frequent intervals of monitoring, as directed by the SSO, are conducted.

If the organic vapor level is greater than 1 ppm above background at the perimeter of the work area, work activities must be shut down or odor controls must be employed. When work shut-down occurs, downwind air monitoring as directed by the SSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

6.2 Real Time Exposure Measurements/Equipment

Monitoring shall be performed within the work area on site to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in the work permit and THA as work is performed. All instrumentation needs to be rated intrinsically safe to prevent fire or explosion.

Table 6-1: Air Monitoring Instrumentation Needed

Instrument		Manufacturer/Model	Substances Detected
☒	**Photo Ionization Detector (PID)**	■ RAE Systems mini-RAE ■ Photovac Microtip ■ Hnu Model Hnu (min. 10.6 eV bulb)	■ Petroleum hydrocarbons ■ Organic Solvents
☒	**Particulate Monitor**	■ MIE Model PDM-3 mini-RAM	■ Aerosols, mist, dust, and fumes

6.3 Monitoring Procedures

The monitoring procedures shown below are general guidelines for sampling activities. In general, readings are considered actionable if sustained readings are observed for 5 minutes or more or if intermittent peaks are seen more than 1 time the action level. A reading more than action level outlined below will require additional ventilation (natural or mechanical) for 30 minutes, followed by re-monitoring.

Table 6-2: Monitoring Procedures and Action Levels

	Parameter	Zone Location and Monitoring Interval	Action Level	Response Activity
☒	**Volatile Organic Compounds (VOCs) and Volatile Hydrocarbons** (total by PID)	Breathing zone, continuously during tasks where exposure to VOCs and volatile hydrocarbons is possible	< 5 ppm	■ Continue monitoring, may continue work in required PPE
			5- 25 ppm (sustained for 5 minutes)	■ **STOP WORK** and notify PM. Investigate the cause of elevated VOC measurements and identify measures to reduce concentrations (cover impacted soils, ventilation, etc.). Work activities shall only continue once levels have decreased to or below 5 units above background. If levels continue above 5 units, only individuals who are medically qualified to wear respiratory protection are permitted to continue work activities with Project Manager approval. Don Level C PPE (organic vapor respirator cartridges), continue monitoring, and initiate continuous air monitoring for benzene.
			> 25 ppm (sustained for 5 minutes)	■ Cease work, exit, and contact the Site Safety Officer, Site Supervisor, and Project Manager.
☒	**Dust not otherwise classified** (total by aerosol monitor)	Breathing zone every 30 minutes during field activities where exposure to excessive dusts are possible	< 5 mg/m^3	■ Continue work in Level D and continue monitoring
			> 5 mg/m^3	■ Upgrade to Level C (P100 respirator cartridges), implement dust suppression measures; contact the Site Safety Officer & Site Supervisor.

Table 6-2: Monitoring Procedures and Action Levels

	Parameter	Zone Location and Monitoring Interval	Action Level	Response Activity
			> 10 mg/m^3	■ Cease activities, implement more effective dust suppression measures; contact the Site Safety Officer & Site Supervisor.
☒	**Dust not otherwise classified** (total by aerosol monitor)	Edge of Exclusion Zone, every 30 minutes during excavation activities	< 5 mg/m^3	■ Continue work in required PPE, monitor air, and implement engineering controls
			> 5 mg/m^3	■ Cease activities and contact the Site Safety Officer & Site Supervisor.
☒	**Facility Chemical Release**	Breathing zone within designated areas/buildings or site-wide, as appropriate for the facility/site	Chemical Release Detected	1. **STOP WORK** and immediately leave the area/building 2. Report to the designated muster location 3. Contact the Site Safety Officer, Site Supervisor and Project Manager 4. Wait for All-Clear to return to work area

7. Subcontractor Selection

7.1 Subcontractor Pre-Qualification

Ensure all subcontractors including lower tier subcontractors are prequalified to perform work for AECOM. Coupa is the preferred method for pre-qualifying subcontractors. If a subcontractor is conditionally approved, ensure the subcontractor meets all conditions of approval. If a subcontractor requires a variance, complete the Subcontractor Variance form, S3AM-213-FM2.

Subcontractor 1:	**Aquifer Drilling and Testing/Cascade Environmental**

Scope of Work:

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Mobilization	■ No	TBD
■ Boring Advancement	■ No	
■ Monitoring well installation	■ No	
■ Monitoring well abandonment	■ No	
■ Demobilization	■ No	

Required Subcontractor Documents:
PM must verify that the following documents are in-place for each subcontractor; check to verify.

Select One:	
☐ Subcontractor's Project/Site-specific Health and Safety Plan **OR** ☒ Subcontractor will work under AECOM's Health and Safety Plan and field personnel will sign the AECOM HASP Acknowledge Form	■ Copy of task specific THAs/JHAs and inspection/tailgate forms
	☐ Competent Person Documentation
	☐ Copy of their business license and training certificates (task specific)
	☐ Copy of their Corporate Safety Management Manual
	☐ Copy of the signed contract

Prequalification Status

Supplier Status		Action(s)
☒ Approved		None, skip to next subcontractor
☐ Conditionally Approved		List condition(s) of approval below and describe how condition(s) will be met.
☐ Pending Approval		Subcontractor is **NOT** approved for use

Safety Conditions of Approval that Apply to Subcontractor *(check all that apply)*

☐	AECOM PM will prepare and obtain AECOM SH&E approval of a variance to use this subcontractor. AECOM PM will ensure the control measures listed in the variance are implemented.
☒	Subcontractor will work under the AECOM HASP. AECOM PM will verify that the AECOM HASP covers the subcontractor's scope of work. Subcontractor's field personnel will review the AECOM HASP and sign the HASP Acknowledgement Form (Section19).
☐	Subcontractor has prepared a Site-Specific HASP for their activities that has been reviewed and accepted by AECOM SH&E.
☒	AECOM Site Supervisor and/or Site Safety Officer will supervise the subcontractor's field activities at the Site.
☐	Other: Click here to Describe

Subcontractor 2:	**Capitol Environmental services Waste hauler**

Scope of Work:

ASSIGNED TASK(S)	HIGH RISK TASK	CONTRACTOR SITE SUPERVISOR
■ Waste hauling ■	■ No	NA

Required Subcontractor Documents:
PM must verify that the following documents are in-place for each subcontractor; check to verify.

Select One:	
☐ Subcontractor's Project/Site-specific Health and Safety Plan **OR** ☒ Subcontractor will work under AECOM's Health and Safety Plan and field personnel will sign the AECOM HASP Acknowledge Form	■ Copy of task specific THAs/JHAs and inspection/tailgate forms
	☐ Competent Person Documentation
	☐ Copy of their business license and training certificates (task specific)
	☐ Copy of their Corporate Safety Management Manual
	☐ Copy of the signed contract

Prequalification Status

Supplier Status		Action(s)
☒ Approved		None, skip to next subcontractor
☐ Conditionally Approved		List condition(s) of approval below and describe how condition(s) will be met.
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☐	Subcontractor has prepared a Site-Specific HASP for their activities that has been reviewed and accepted by AECOM SH&E.
☒	AECOM Site Supervisor and/or Site Safety Officer will supervise the subcontractor's field activities at the Site.
☐	Other: Click here to Describe

Attach additional sheets as required to account for each subcontractor performing field work.

8. Training and Documentation

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure S3AM-003-PR1 establishes the general training requirements for AECOM employees. Personell will have completed the 40-hour OSHA Hazwoper training.

8.1 Site-Specific Training Requirements

The following training is applicable to the site and/or scope of work:

Table 8-1: Site Specific Training Requirements

	Training	Applies to
☒	**ERP/HASP and Site Orientation**	All Employees and Subcontractors
☒	**Vehicle/Driver Safety & Defensive Driving**	All Employees who drive on behalf of AECOM
☒	**Field Safety**	Employees visiting the field that does not require HAZWOPER
☒	**Speak Up/Listen Up (SULU)**	All AECOM field employees and supervisors
☐	**First Aid / CPR**	Designated employees or employees performing high risk activities and medical attention is more than 4 minutes away
☐	**Respiratory Protection & Fit Test**	Employees needing to wear respirators
☐	**OSHA 10-Hr. Construction Safety (or CSTS 2020 in Canada)**	All employees working on jobsites with construction type hazards
☐	**OSHA 30-Hr. Construction Safety**	All employees supervising/overseeing jobsites with construction type hazards
☒	**HAZWOPER 40-Hour and 8-Hr. Annual Refresher**	On HAZWOPER sites, in EZ, exposed to hazardous contamination
☐	**HAZWOPER Supervisor**	Employees managing others in HAZWOPER activities or at HAZWOPER Sites
☐	**Hazardous Materials Shipping (U.S.)**	Employee responsible for shipping HZM/HZW/DG and/or signing manifests
☐	**Hazardous Materials Communication**	When hazardous or toxic chemicals are being used on site.
☐	**Transportation of Dangerous Goods (CAN)**	Employees responsible for shipping/transporting regulated hazardous materials that exceed regulatory requirements
☐	**Under Bridge Inspection Unit (UBIU) AECOM University module**	Employees working in a UBIU
☒	**Local and/or Client Requirements:**	No white or blue hard hats
☐	**Other:**	NA

9. Site Control

9.1 Site Work Zones

Site layout and site control need to be coordinated to achieve a productive work environment and efficient work process while minimizing exposure of employees and the public to hazards associated with the work. Consider the following items when planning the site layout and controls. Check the description of the site controls **already** in place:

Table 9-1: Site Controls Already in Place

- ☒ Work area is within a facility/property with secure and restricted access provided by client or third party
- ☐ Work area is enclosed within a facility/property, but access is not restricted via locks, guards, or gates
- ☐ Work area is on a property that is open, but access by the public is unlikely
- ☐ Work area is on a property that is open and access by the public is likely
- ☐ Work area is in a roadway or right of way of a roadway (Traffic Control/Protection Plan required S3AM-306-PR1)
- ☐ Work area is in a parking lot or driveway
- ☐ Work area is on or near railroad, including right of way, active lines and crossings
- ☐ Other: If applicable, specify here OR type N/A

Consider the following items when planning the site layout and controls:

- "Line of Fire" hazards- overhead utilities, falling/ tipping equipment, release of energy/ pressure, flying debris
- Noise, dust, odor suppression
- Contamination containment and decontamination area layout
- Traffic control for site vehicles/ equipment (public traffic control requires Traffic Control Plan)
- Restricted access for areas requiring special training, skills, or certifications
- Restriction of work near railroads
- Presence or creation of excavations
- Loading/unloading areas
- Portable restrooms
- Dumpsters and bins
- Equipment lay down
- Heavy equipment parking
- Overnight safety and security needs

The following additional site controls will be implemented in work area(s) to protect the public and AECOM work team:

Table 9-2: Additional Site Controls to be Implemented

Control Item	Description of Type and Application
☒ **Fence**	Site surrounded by security fence with entrance regulated by Con Edison and Iroquois.
☐ **Locks**	N/A
☐ **Barricades**	N/A
☐ **Cones**	N/A

☐ **Tape**	N/A
☐ **Hole Covers**	N/A
☐ **Other:**	N/A

9.2 Simultaneous Operations

Simultaneous and neighboring operations, including activities performed by the general public, our clients, and other workers or contractors working near our employees, often present a need for added co-ordination and communication to address hazards that are presented by multiple operations.

Table 9-3: Simultaneous Operations Within the Site

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

Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)	
Natural Gas Compression Station	ConEd	Lyndsay Kresic	(203) 944-7019	☐ Yes	☐ No
				☐ Yes	☐ No
				☐ Yes	☐ No

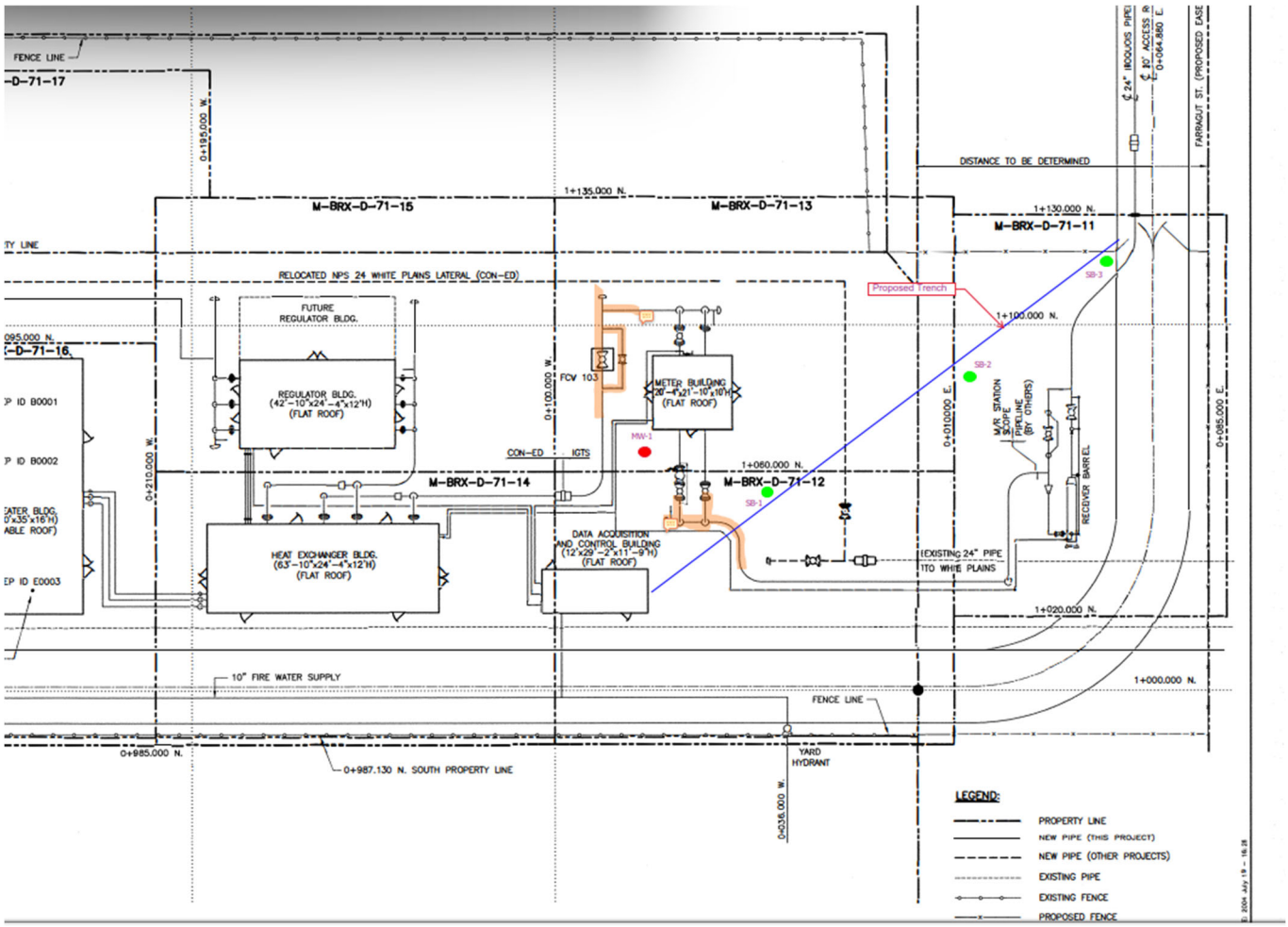
Table 9-4: Simultaneous Operations on Neighboring Sites

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

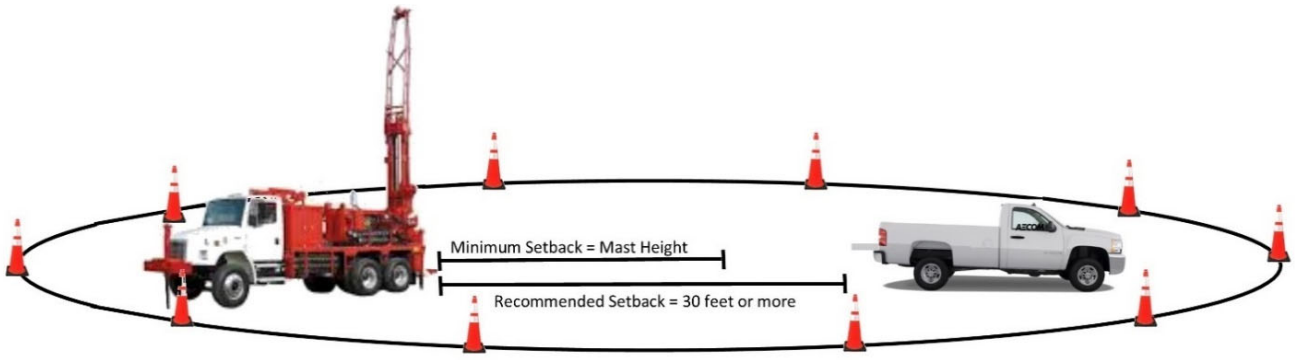
Activity	Company	Contact Person (Activity Lead)	Contact's Phone Number	Addressed in THA(s)	
				☐ Yes	☐ No
				☐ Yes	☐ No
				☐ Yes	☐ No

9.3 Site Control Maps/Diagrams

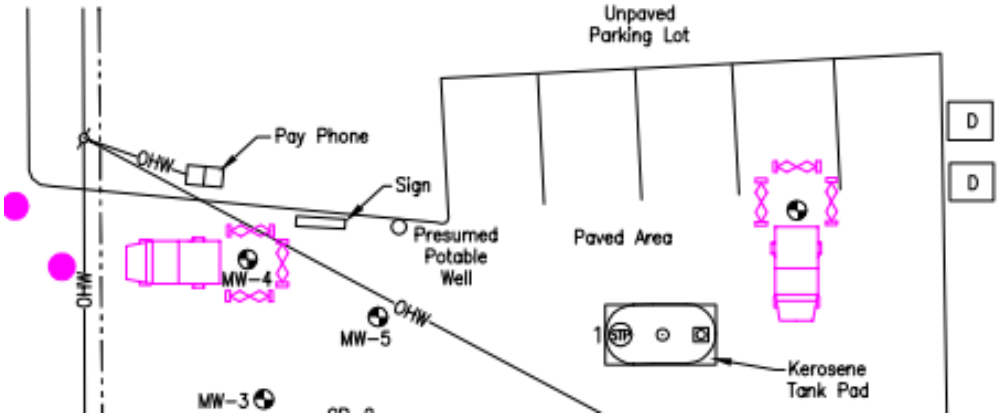
Work Area Layout



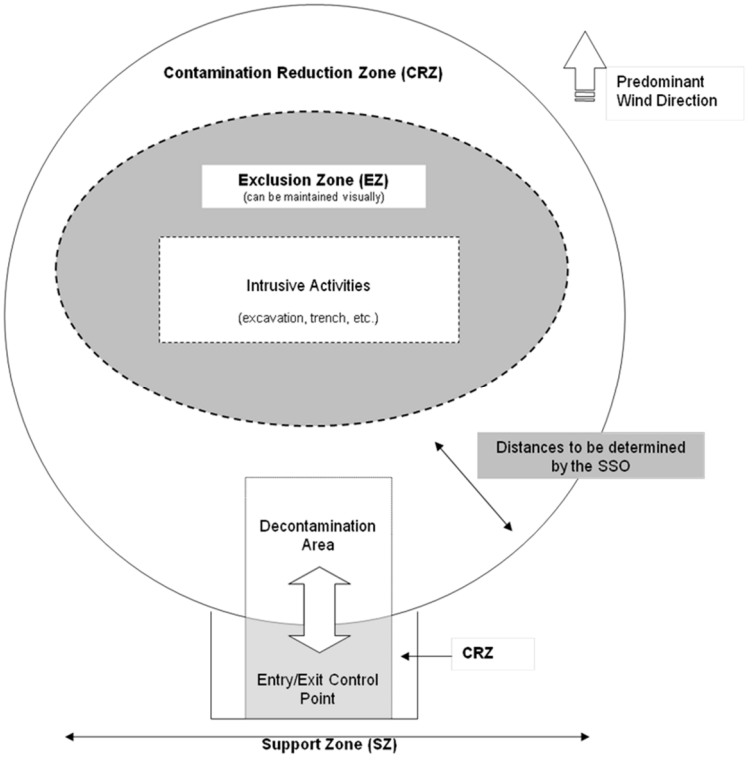
Example Drilling Work Area Layout



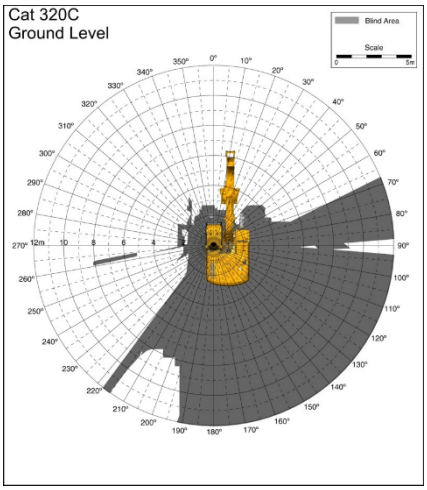
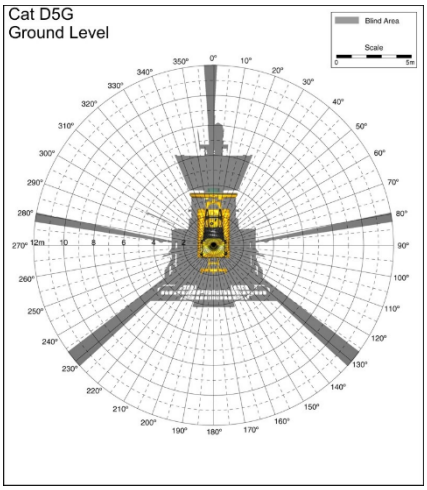
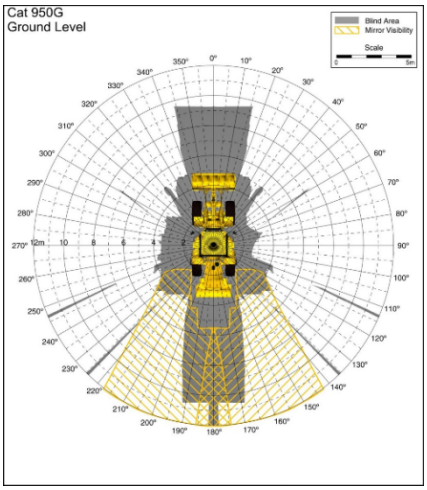
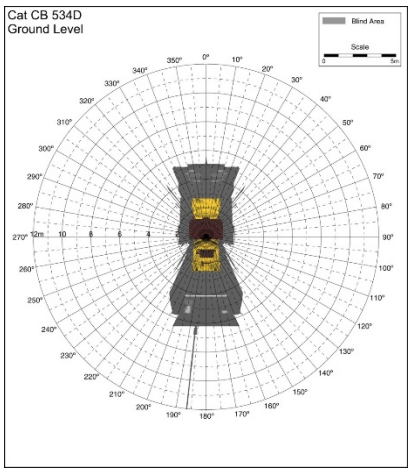
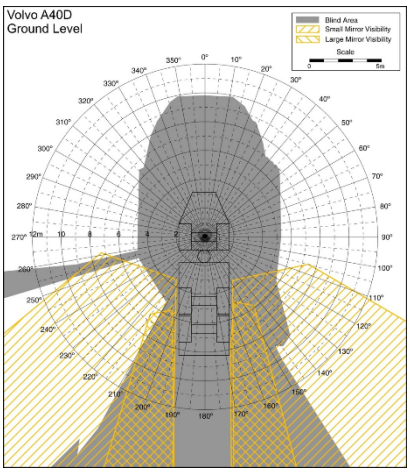
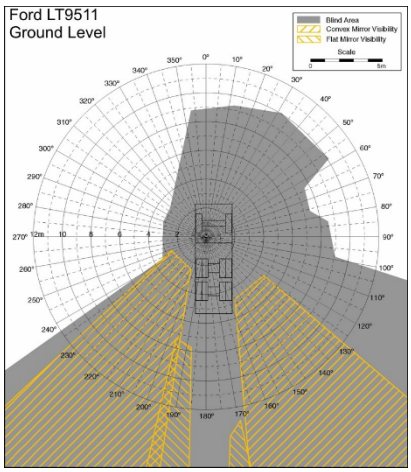
Example Groundwater Sampling Area Layouts



Example Exclusion Zone Layout



Example Heavy Equipment Blind Spots and Swing Radius / Exclusion Zones

Excavator	Bulldozer	Front-End Loader
		
|--39.4 ft/12m --|	|--39.4 ft/12m--|	|--39.4 ft/12m--|
Smooth Drum Roller	**Haul Truck (Articulated)**	**Haul Truck (Non-Articulated)**
		
|--39.4 ft/12m --|	|--39.4 ft/12m--|	|--39.4 ft/12m--|

Note: The above maps are provided as examples only – Blind spots and swing radius vary by equipment type, make, and model.

9.4 Situational Awareness – Personal Security

The ability to observe, identify, process, and understand critical elements of information within changing environments. If you see something, say something. Know what is going on around you, anticipate what might happen next. Have a plan of what you will do next, including where you are going, alternate routes and a plan of action. Evaluate what is happening around you as you move through daily activities, noting if something looks out of place or unusual. Be aware of barriers that may change your critical thinking such as distractions, being in a hurry, fatigue, focus lock and past experiences. Listen to your instinct – if something doesn't look or feel right, do something about it. All employees need to review the Situational Awareness Guidance for Employees. In event of a Security Issue please contact **Global Security & Resilience at GSR@aecom.com.**

10. Personal Protective Equipment

The use of Personal Protective Equipment (PPE) forms the final barrier of protection between the employee and the hazard and applies to all employees at the work site, including Subcontractors, visitors and client or customer representatives. For additional information on PPE, please review the Personal Protective Equipment, S3AM-208-PR1.

The minimum PPE required on an AECOM project is as follows:

- Hard Hat or Helmet
- Safety Glasses with side shields
- High Visibility Safety Vest
- Shirt with sleeves that cover the shoulders.
- Long Pants
- Safety-toe Boots
- Gloves (on person) – Required to be worn if handling materials, equipment, etc.

Specific PPE shall also be specified in Task Hazard Analyses (THAs) such as glove type (i.e. material, level of protection, etc.). Where possible, hazards will be eliminated or controlled to reduce the risk associated with a specific task.

These controls include:

- Elimination of the hazard
- Isolation of the hazard
- Engineering Controls
- Administrative Controls

With the exception of prescription safety eyewear and safety toed boots (there may be allowances for the purchase of these items), AECOM will make available all required PPE for its employees. All employees will receive training in the use, care, maintenance, and storage of the PPE issued to them.

All personal protective equipment will meet the requirements of local, state, federal, client and AECOM SH&E regulations and procedures. Where site-specific PPE requirements exist, all AECOM employees, subcontractors, and visitors, who work on the Project, will follow those requirements.

- PPE will **not** be modified or changed.
- All PPE that is damaged or in need of service or repair will be removed from service immediately.
- All PPE that has been removed from service will be tagged “OUT OF SERVICE” and will not be returned until repaired and inspected by a qualified person. Defective PPE must be removed from site to prevent it from being used.

11. SH&E Technology

At AECOM, we encourage the use of new technology to eliminate or reduce the risk our employees are exposed to. Mark the technology you will be using in this project (if any):

Table 11-1: SH&E Technology Being Used on Site/Project

- ☐ **Wearable Technology/Smart PPEs** (e.g. clothes, helmets, glasses, harness)
- ☐ **Site Sensors** (e.g. Movement, angle, noise, carbon monoxide, Dust)
- ☐ **Fatigue Monitoring**
- ☑ **Phone/Tablet Applications** or software: EQUIS Collect/Tailgate Meetings
- ☐ **Connected Worksites** (i.e., connection between employees or project elements to be successful)
- ☐ **Drones**
- ☐ **Virtual Reality (VR) or Augmented Reality (AR)**
- ☐ **GPS** – Location devices: Click here to enter Location Devices
- ☐ **Radio Frequency Identification** (RFID)
- ☐ **Other:** Click here to enter Other
- ☐ **None of these:** We will not use any technology in this project to reduce hazards

Find available tools and/or share the tools you will be using in the AECOM Technology Toolbox or let us know what would be interesting to assess by **clicking here** or explore in the NSC Technology site for new available safety technology.

12. Safety, Health, and Environment Program

12.1 AECOM SH&E Policy

AECOM's Safety, Health and Environment Policy, which establishes the framework to attain best-in-class Safety, Health and Environmental (SH&E) performance in the interest of benefitting AECOM's employees and stakeholder in the global marketplace, is available on AECOM's Ecosystem (intranet).

12.2 Safety for Life

"Safety for Life" is a comprehensive integrated AECOM Safety Management System that drives our employees toward AECOM's commitment to achieving zero work-related injuries and/or illnesses; preventing damage to property and the environment; and maintaining an environmentally friendly and sustainable workplace. Our Safety for Life program is supported by nine Life Preserving Principles that apply to all AECOM activities.

12.3 Life Preserving Principles

AECOM has adopted these "Life-Preserving Principles" to help demonstrate the commitment of our Safety for Life program. We firmly believe these "Life-Preserving Principles" will enable AECOM to achieve its goal of zero employee injuries, property damage and an environmentally friendly and sustainable workplace. The nine Life-Preserving Principles (S2-001-ATT1), along with their descriptions, can be found on AECOM's Ecosystem (intranet).

Commitment:
Managers will lead on safety, continuously demonstrating commitment to the highest standards.

Participation:
All employees are encouraged to engage in helping to control the risks we face.

Budgeting and Staffing for Safety:
The costs of managing SH&E are budgeted into every project. Our safety staff are fully trained to provide expert guidance.

Pre-planning:
We assess risks and produce detailed plans to control them during design, planning, and execution of work.

Contractor Management:
We carefully select and collaborate with all our partners to create a safe working environment.

Recognition and Rewards:
Employees are rewarded for safety excellence, and we share best practices.

Orientation and Training:
Our employees will be provided with effective safety training in order to identify and mitigate hazards in the workplace to prevent injuries to themselves and others who may be affected by their actions.

Incident Investigation:
We investigate recordable incidents and serious near misses to understand the causes and take action to prevent recurrence.

Fit for Duty:
All staff come to work each day fit and well, so they do not pose a hazard to themselves or others.

12.4 Fitness for Duty

One of AECOM's nine Life-Preserving Principles is Fitness for Duty (see Fitness for Duty procedure (S3AM-008-PR1). Fitness for Duty means that individuals are in a state (physical, mental, and emotional) that enables them to perform assignments competently and in a manner that does not threaten the health and safety of themselves or others. On certain projects or for specific tasks, fit for duty certifications may be requested of medical providers by SH&E Managers or Human Resources (HR). Employees should ensure they are fit for duty prior to leaving home and unimpaired by substances or fatigue, and if necessary, contact your supervisor rather than attempting to report to work in unfit condition. Supervisors must observe their employees

and work with the employee, SH&E staff, and HR to address deficiencies. AECOM will **NOT** tolerate retaliation against any employee for filing a complaint or concern regarding their fitness for duty or participating in any way in an investigation.

12.5 Proactive Health

AECOM is committed to promoting proactive health activities in addition to the planning for prevention of safety and environmental incidents. Proactive health activities will be completed on an on-going basis at AECOM on a corporate-wide basis (i.e., the wellness program associated with employee benefits), at offices, and at this project site. Management will be actively involved in providing and encouraging opportunities for health and wellness education and improvement. Health initiatives and education will be discussed periodically during office-based meetings as the safety moment or during the daily tailgate meeting as a toolbox talk. Topics may be related to, but are not limited to, the following:

- ✓ Heart health
- ✓ Stress management
- ✓ Smoking cessation
- ✓ Diabetes prevention
- ✓ Diet
- ✓ Exercise benefits

Topics and educational materials can be located on the AECOM Wellness page, National Institutes of Health website, Centers for Disease Control and Prevention website, and other reputable sources online.

In addition, the field team will be encouraged to participate in a daily stretch and flex routine (a standardized way to avoid soft tissue damage from work activities) to the best of their abilities, given their own personal limits. It is particularly beneficial to warm and loosen muscles before repetitive work, manual handling of loads, and when working in cold temperatures or with static postures. The Stretch and Flex manual and poster (**Attachment C**) serve as guidance for the leader to follow.

12.6 Fatigue

One aspect of fit for duty is fatigue management. AECOM has developed procedures that limit work periods or requires additional rest under certain circumstances, including during long-distance travel or when working at high altitudes. These procedures also set limits on extended work periods of 14 hours per day or 60 hours per week. A fatigue management plan is required if longer working hours are necessary (see Fatigue Management Procedure S3AM-009-PR1).

12.7 Driving and Vehicle Safety

The proper operation of vehicles is critical to protecting the safety of AECOM employees and subcontractors. Drivers face numerous hazards while operating vehicles. Some of the hazards include collision with another vehicle, collision with a fixed object, vehicle break down or failure, or falling asleep or becoming otherwise incapacitated while driving. All employees will adhere to Driving procedure S3AM-005-PR, which includes the following key practices:

1. **Authorized Drivers**
   Managers must authorize drivers following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducting AECOM business.

2. **Electronic Devices Prohibited**
   AECOM prohibits use of all portable electronic devices while operating a motor vehicle/ equipment, which includes being stopped at a traffic light or stop sign. Electronic devices include, but are not limited to, all mobile phones, two-way radios, pagers, iPods, MP3s, GPS, DVD players, tablets laptops, and other portable electronic devices that can cause driver distraction. Hands-free device use is **NOT** allowed.

   - GPS units and devices used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Electronic devices shall be setup for operation prior to commencing driving activities and shall NOT be changed by the driver while driving.

3. **Vehicle Inspections**
   The driver shall conduct pre-trip vehicle inspections prior to each trip. A vehicle inspection checklist, S3AM-005-FM2, can be used to guide and document the inspection process. Vehicle inspection is to include a 360-degree walk around and visual inspection under the vehicle for leaks and obstructions prior to moving the vehicle.

4. **Training**
   All drivers shall complete defensive driver training. Additional training (i.e., hands-on defensive driver training) may apply for medium and high-risk drivers; see Driving procedure S3AM-005-PR and SHE Training procedure S3AM-003-PR for more details.

5. **Journey Management Plan**
   Drivers who undertake trips in excess of 250 miles (400 kilometers) one way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a Journey Management Plan using S3AM-005-FM1 or equivalent.

6. **Secure Loads**
   Cargo is only to be carried within the passenger compartment of a vehicle when segregated and restrained to prevent objects from becoming distractions, obstructions, or projectiles to occupants should emergency vehicle maneuvers be required (e.g., harsh braking or crash). All goods transported on flatbed trucks or in pickup beds must be securely fastened to prevent them from becoming hazards. All applicable laws and regulations regarding securing of loads must be met. It is prudent to check the load after a few miles to ensure that load has not shifted or loosened prior to completing the remainder of the trip.

12.8 Fatigue and Driving Safety

The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

- ✓ After strenuous fieldwork, consider overnight accommodation or vehicle sharing for staff who are not acclimatized to the type of work.
- ✓ Microsleep can occur with a limited warning, and may be linked to several factors, for example:
  - Microsleep is most likely to occur during times when the circadian rhythm dictates the body should be asleep, such as at dawn, late at night, or in the mid-afternoon (e.g., 1 and 4 am and 1 and 4 pm.).
  - Potential to feel drowsy after a meal.
  - Driving long distances (considered potentially monotonous) even with sufficient sleep.
  - Prolonged sitting and warm ambient temperature may also increase the feeling of sleepiness.
- ✓ If safe to do so, consider undertaking actions to disrupt the microsleep event while identifying a safe place to stop, e.g., open a vehicle window, listen to upbeat music/change music source, or ask the passenger (if present) to engage in conversation.
- ✓ Ensure field staff are familiar with the signs of fatigue and mitigation factors.

The most common visible signs of microsleep include the following:

- Eyelid drooping
- Eyelid closure
- Head nodding
- Brief periods of snoring
- Wandering thoughts

If any of the above become apparent, immediately pull over to a safe location and contact your PM or SH&E representative.

12.9 Hand Safety

The hands are exposed to hazards more than any body part. SH&E Hand Safety Procedure S3AM-317-PR describes requirements and best practices including these notable practices:

- **All personnel shall have gloves in their immediate possession 100%** of the time when in a shop or on a work site. Gloves that address the hazard shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc. Use the Gloves Needs Assessment (S3AM-317-FM1) to help determine the appropriate glove for the hazard(s).
- **Fixed open-blade knives are prohibited** from use during the course of AECOM work. Examples of fixed open-blade knives include pocket-knives, multi-tools, hunting knives, and standard utility knives. For more information about cutting tools, see S3AM-317-ATT1 Safe Alternative Tools.

12.10 Substance Abuse

Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment, and facilities. AECOM is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable. AECOM Substance Abuse Prevention Procedure (S3AM-019-PR1) prohibits the use, possession, presence in the body, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises. Company premises refer to all property, offices, facilities, land, buildings, structures, fixtures, installations, aircraft, automobiles, vessels, trucks and all other vehicles and equipment - whether owned, leased, or used.

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood- or mind-altering substances, and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances; and
- Alcoholic beverages while at work or while on any customer- or AECOM-controlled property.

This policy does not prohibit lawful use and possession of current medication prescribed in the employee's name or over-the-counter medications. Employees must consult with their health care provider about any prescribed medication's effect on their ability to perform work safely and disclose any restrictions to their supervisor.

Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution, and possession of marijuana are violations of federal law and AECOM policy and will subject an employee to disciplinary action up to and including termination in accordance with controlling law. In Canada, where medical and recreational marijuana use is legal, employees must still follow Federal and Provincial laws, and AECOM policy with regards to use and possession. Employees found to be in contravention of legal requirements or AECOM policy will be subject to disciplinary action up to and including termination.

12.11 Rewards and Recognition

One of AECOM's Life Preserving Principles is Recognition and Rewards for proactive safety, health, and environmentally focused behaviors. All projects are expected to participate in the rewards and recognition programs available on the Corporate and DCS Americas SH&E ecosystem pages. Large, long term projects are encouraged to establish a project specific rewards and recognition program which incorporates project specific goals and activities (template available S3AM-020-FM1). ***All rewards and recognition programs must emphasize the 9 Life Preserving Principles and proactive SH&E activities NOT solely the achievement of lagging metrics ("injury/incident-free" hours, etc.) as those may discourage incident reporting.***

12.12 Stop Work Authority

AECOM empowers and expects all employees to exercise their Stop Work Authority (see Stop Work Authority Procedure (S3AM-002-PR1) if an incident appears imminent, or when hazardous behaviors or conditions are observed. A stop work request can be informal if the situation can be easily corrected or may require shutting down operations if revised procedures are necessary to mitigate the hazard. If an AECOM employee observes an imminently hazardous situation on a site controlled by others (i.e., a client-managed contractor), the employee can always stop work for themselves by removing themselves from the situation. Employees also may attempt to stop work to avoid allowing the contractor to come to harm by immediately notifying the contractor foreman or site engineer, or if necessary, the client or party managing the contractor.

No employee should object to the issuance of a stop-work request, nor can any disciplinary action be levied against the employee. All employees must agree that the situation has been mitigated before resuming work. No employee will be disciplined for refusing to work if they feel it is unsafe.

13. Roles and Responsibilities

13.1 AECOM Project Manager

The AECOM Project Manager (PM) may delegate responsibilities to an AECOM Deputy PM or AECOM Task Manager (TM) with equivalent competencies. The AECOM PM is responsible to:

- Understand the scope, performance standards, objectives, and applicable AECOM and bp requirements and expectations,
- Ensure the workforce, including subcontractors, is aware of the project scope and objectives, and the associated performance standards, requirements, and expectations,
- Verify that the full scope of work has been risk assessed with Task Hazard Assessment (THA) prepared, reviewed, and approved for each task,
- Authorize the start of all work tasks/activities within area of responsibility,
- Assign competent Crew Leaders, Permit Issuers/Approvers, and Persons in Charge as appropriate for the project scope of work,
- Be knowledgeable of and participate, where needed, in permit development and verification of the necessary work permits, and
- Verify that work activities are consistent with the policies and procedures.

13.2 AECOM Site Supervisor

The Site Supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans and HASP. The Project Manager may act as the Site Supervisor while on site. The Site Supervisor's responsibilities include:

- Verify the personnel, equipment/machinery and instruments anticipated to mobilize to site.
- Communicate project roles and responsibilities.
- Discuss planned activities for the day and any potential simultaneous operations (SIMOPs).
- Establish staging and work areas for planned activities.
- Confirm crews have reviewed and updated, as necessary, task hazard assessments prior to beginning the task.
- Coordinate and document project activities.
- Monitor for deviations and changes in scope, personnel, methods, materials, equipment/machinery, instrumentation, and site conditions.
- Notify the AECOM project manager of changes and coordinate change management.
- Escort or delegate the escorting of site visitors.
- Serve as AECOM's point of contact with the host facility and person-in-charge for simultaneous operations (SIMOPs).
- Delegate stop work authority to all project employees and report all unsafe acts/behaviors and conditions, near misses and incidents to the AECOM project manager.
- Lead by example – walk the talk.

13.3 AECOM Site Safety Officer

The Site Safety Officer supports the Site Supervisor in providing a safe work environment. Not all sites will have a designated Site Safety Officer; the decision should be made by the Project Manager and SH&E Manager taking into consideration the complexity and risks of the scope of work. The Site Supervisor may act as the Site Safety Officer on sites without one. The Site Safety Officer's responsibilities include:

- Conduct the site safety orientation for the entire field team, including subcontractors, and site visitors.
- Lead the tailgate safety meeting.
- Discuss hazards present at the site and/or within environmental media and their control measures.
- Communicate air monitoring methods and action levels.
- Explain emergency response and reporting procedures, including emergency contacts and muster and shelter-in-place locations.
- Establish exclusion and contamination reduction zones, as needed.
- Verify SWP/HASP, THA and safety requirements and expectations are being met.
- Confirm hazard control measures are in-place and effective.
- Perform housekeeping and site inspections to ensure a safe working environment.
- Engage outside safety, health & environment resources, as needed, to allow for the safe performance of the work.
- Assist in incident investigations and identification and implementation of corrective actions.
- Lead by example – walk the talk.

13.4 AECOM SH&E Manager

Responsibilities of the SH&E manager is to:

- Promote the AECOM Safety for Life Program and our Nine Life Preserving Principles.
- Understand the application of SH&E regulatory requirements relevant to SH&E in the company's operations and be aware of changes in regulations which may affect the company.
- Be formally trained, licensed, or certified where the regulations require.
- Assist with the budgeting and staffing process to ensure project teams have the knowledge and resources needed to perform their work safely.
- Be aware of all incidents, near misses, observations, unsafe acts, and unsafe conditions that are reported and participate in the investigation process where required.
- Verify incidents are reported to regulatory bodies in accordance with local legislation.
- Review investigation findings to confirm identified corrective actions are appropriate and subsequently implemented.
- Review and accept site-specific SH&E Plans and Task Hazard Analyses (THAs).
- Assist in the preparation of risk assessments.
- Assist in the review of SH&E training needs.
- Verify necessary training as required by AECOM policies and procedures and/or the regulations.
- Assist in the setting of SH&E expectations at project level and review them periodically.
- Perform project SH&E audits on a periodic basis.
- Monitor the corrective actions taken, where audits identify non-conformance or opportunities for improvement, for confirmation of their completion and effectiveness.
- Lead by example, walk the talk.

13.5 AECOM Workforce

The workforce members play an important role in safety. Each workforce member shall:

- Comply with the host facility, client, and AECOM requirements for their assigned tasks and the site.
- Have the appropriate training/competencies to complete their assigned task(s) safely and efficiently.
- Participate in risk reviews and/or THAs and provide input to ensure that the full scope of work, associated hazard, and their control measures have been adequately addressed to allow for the work to proceed safely and efficiently.
- Conduct appropriate work area and equipment inspections prior to work activities.
- Assist in identification of work process deficiencies and recommend possible improvements if applicable.
- Remain focused and aware of surroundings while on the jobsite to changes that may impact ability to perform job task or affect the safety of other team members.
- Understand the Emergency Response Plan (ERP) and be able to respond as it directs per the assigned role.
- Stop work, intervene (Speak Up, Listen Up), and report all observed unsafe work activities, unsafe site conditions, and any incidents with or without (near miss) consequences.
- Upon request, participate in incident investigations and/or re-enactments.

13.6 Visitors

Authorized visitors (e.g., client representatives, regulators, AECOM management staff, etc.) requiring entry to any work location on the site will be briefed by the Project Manager, Site Supervisor, or Site Safety Officer on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and PPE that are required for entry to any controlled work area; visitors must comply with these requirements at all times.

If the site visitor requires entry to any exclusion zone (EZ), but does not comply with the above requirements, the visitor will be denied access to the EZ. If the visitor disregards instructions to remain outside the EZ, work activities will be immediately suspended, and the situation reported and documented.

Unauthorized visitors, and visitors not meeting the specified qualifications, will **NOT** be permitted within established controlled work areas. If unauthorized visitors and/or visitors not meeting the specified qualifications enter a controlled work area and/or EZ, work activities will be immediately suspended, and the situation reported and documented.

14. Subcontractor Management

14.1 AECOM Roles/Responsibilities for Sub Management

When managing an AECOM Subcontractor of any tier, AECOM management and supervision will follow the requirements in S3AM-213-PR1 and are responsible for the following:

- Direct all activities of the facility, site, or project location.
- Ensure appropriate training and experience of AECOM personnel responsible for overseeing subcontractor work.
- Verify subcontractors have the appropriate trained and competent personnel to perform their activities in a safe, healthful, and environmentally responsible manner.
- Pre-qualification of Subcontractor – Prior to performing work on an AECOM project, management and supervision must verify the Subcontractor has been pre-qualified. AECOM's preferred method of prequalification in Coupa, but there are other ways to prequalify a subcontractor.
- Ensure all subcontractor employees attend the AECOM daily tailgate safety meeting.
- If you have any questions about subcontractor pre-qualification, reach out to an AECOM SH&E professional.

14.2 Subcontractor Roles/Responsibilities for Safety

Subcontractors must provide AECOM with a designated Subcontractor Safety Representative (SSR). Their responsibilities are as follows:

- Direct employees' means and methods of work and how to work safely.
- Be knowledgeable of and understand the safety requirements of the subcontractor's activities.
- Staff the project with employees that are trained and knowledgeable of the tasks they will be performing.
- Have the ability to recognize hazards and the authority to take prompt corrective actions.
- Implement the subcontractor safety program.
- Serve as the direct contact with AECOM regarding resolution of SH&E issues.
- Immediately report all work-related injuries/illnesses/incidents, environmental incidents, and regulatory inspections/violations to AECOM according to AECOM procedures and/or client requirements.

14.3 Subcontractor HASP/THAs

If the subcontractor's scope of work includes hazards that are not covered by the AECOM Health and Safety Plan (HASP), the subcontractor will need to provide AECOM with their site-specific HASP and task-specific Task Hazard Analyses (THAs). All subcontractor procedures must at a minimum comply with client and AECOM requirements to ensure that hazards associated with the performance of their work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to AECOM for review prior mobilization to the site.

15. Training and Documentation

The following sections describe the standard practices or programs that AECOM will establish to prepare employees to perform work safely and consistent with AECOM policy and Procedures. For additional information on SH&E Training, review the Safety, Health and Environment Training, S3AM-003-PR1.

15.1 HASP/Site Safety Orientation

The Project Manager shall conduct a project/site-specific HASP orientation prior to the start of field operations, with support as needed by the SH&E Manager, Site Safety Officer, or Site Supervisor. This meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site. Minimum items to be covered are listed in **Attachment D**. Participants will then sign the HASP Personnel Acknowledgement register at the end of the HASP.

15.2 Worker Training and Qualifications

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure S3AM-003-PR1 establishes the general training requirements for AECOM employees.

See **Section 8.1** of this HASP for site-specific required safety training and documentation.

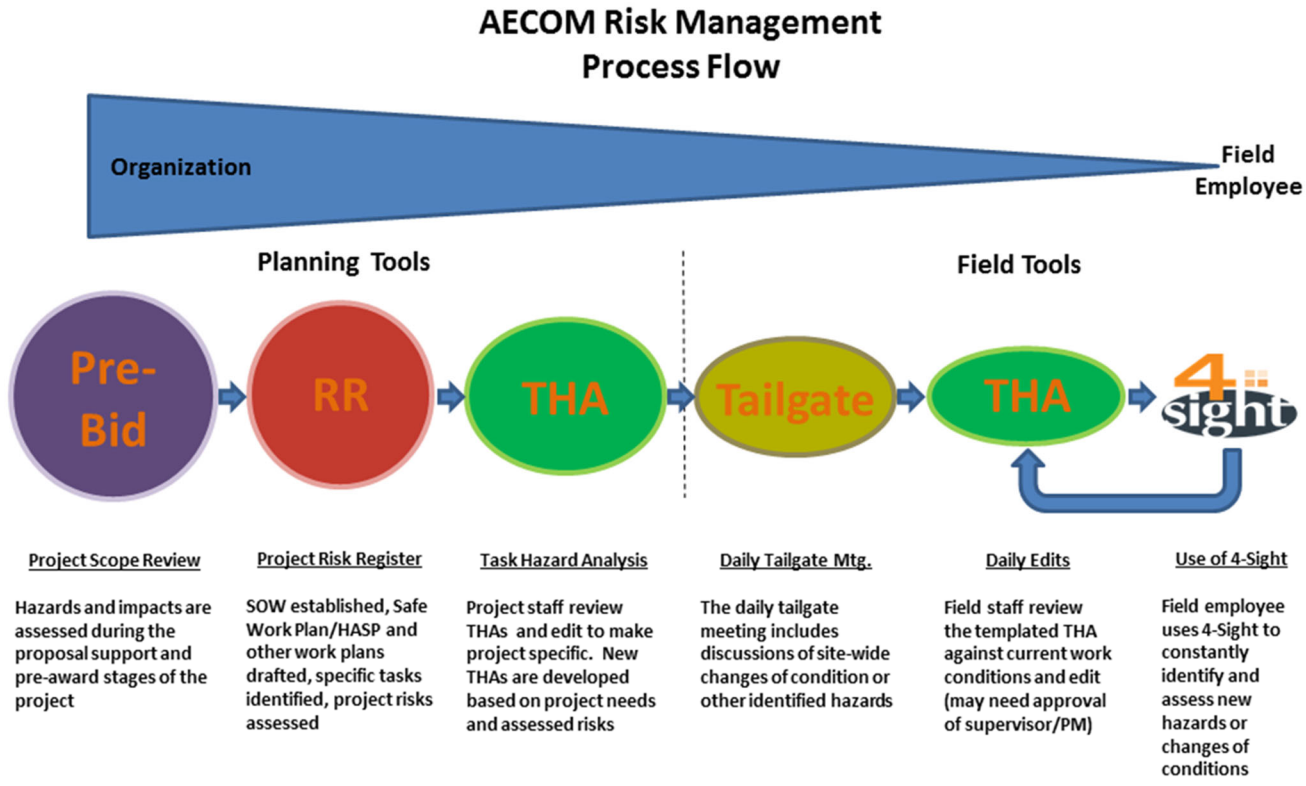
15.3 Competent Person(s)

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

AECOM's Competent Person Designation Procedure, S3AM-202-PR1, explains the roles, responsibilities and procedures of naming a competent person. Review Error! Reference source not found. of this HASP for a list of site-specific competent person(s) required for this scope of work.

16. Hazard Assessment and Control

AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and AECOM operations. See S3AM-209-PR1, Risk Assessment and Management, for details regarding AECOM's process. This approach is illustrated below and described in the following section.



AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and AECOM operations. See S3AM-209-PR1, Risk Assessment and Management, for details regarding AECOM's process. This approach is illustrated below and described in the following section.

16.1 SH&E Procedures

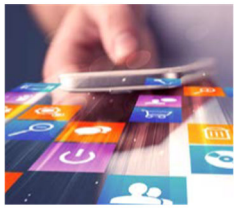
All AECOM SH&E procedures, in their controlled copy version, are available on the internal SH&E Policy and Procedures ecosystem page. Programmatic procedures referenced in this document (for example SH&E Training) do no need to be printed for inclusion in this HASP. The applicable field procedures checklist is in the Physical Hazards section below and procedures are included in **Attachment B**.

16.2 Task Hazard Assessments and Daily Tailgate Meetings

THA forms (a blank version is located in S3AM-209-PR1) shall be prepared for each task to be performed as part of the scope of work. This includes driving to the site, parking, and walking as well as the hazards, associated risk, and appropriate controls for all other work activities. The DCS Americas Templated THA Library may also be used to find previously approved THAs, though these should be modified to be project and site-specific. The preparer shall have one THA form for each task in the Scope of Work found in this work plan (**Attachment A**) and shall also include blank copies.

In the field, all employees and visitors shall review the daily THAs and conduct and attend the daily tailgate meeting. When employees arrive on site, conditions may be different than originally planned or additional job steps may be required. The THA requires workers to update or 'dirty up' the THA in the 'On-Site Edits' rows to assess the risks presented by the changed condition(s) and requires the worker to describe steps to reduce the risk. If the hazard(s) cannot be successfully mitigated, the work will **NOT** proceed.

A Site Safety Officer (SSO) or field supervisor shall conduct a daily tailgate meeting to review the specific requirements of this HASP prior to the commencement of daily project activities. Attendance at the daily tailgate meeting is mandatory for all employees and subcontractors at the site covered by this HASP. Simultaneous operations are encouraged to attend each other's tailgate meetings or at the very least the supervisors shall discuss the coordination of activities and associated hazards of each other's tasks. The tailgate meeting must be documented by the field Supervisor or SSO, using the New Daily Tailgate Meeting App. Use the appropriate QR code to download the App and/or go to the Daily Tailgate Meeting App Ecosystem page for details, guides, training sessions and/or other information:



iOS

Android

As an alternative you can also use or the Daily Tailgate Meeting form (S3AM-209-FM5), a blank copy of which is included in **Attachment A**.

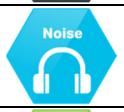
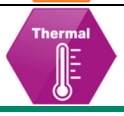
16.3 Hazard Categories

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

Table 16-1: AECOM Hazard Categories

Category	Definition
	A biological hazard is any living organism that could cause irritation, allergic reaction, bites, stings, illness, infection, or other injury.
	A chemical hazard is any chemical substance that could potentially cause harm to humans, equipment, or the environment either through contact, ingestion, absorption, inhalation, or reaction.
	Electrical hazards are present whenever there is potential for contact with an electric charge.

Table 16-1: AECOM Hazard Categories

Category	Definition
	Gravitational force can cause tools, equipment, materials, and people to fall either to the same level or from heights to the earth or a lower surface.
	A mechanical hazard when there is energy within the components of a mechanical system within an otherwise stationary piece of equipment/machinery.
	Objects or substances that can move or are moving not due to gravity create a motion hazard. Motion hazards also include body motions and positioning such as bending, stretching, kneeling, etc.
	Noise hazards are sounds that may prevent effective communication or cause hearing loss.
	Any physical matter such as gases, liquids, and springs that is compressed or under a vacuum creates a pressure hazard.
	Radiation hazards include both ionizing and non-ionizing energy emitted from radioactive elements or sources.
	Thermal hazards can cause injury or damage due to their temperature.

16.4 4-Sight

When preparing hazard assessments and throughout the day workers should use 4-Sight. This is a mental process through which workers ask themselves (and each other) four questions designed to effectively assess hazards. Using these questions during each task, especially those without established THAs, will help workers identify hazards and condition changes so that they can control them or stop work to seek assistance.

- **What am I about to do?**
- **What could go wrong?**
- **What could be done to make it safer?**
- **What have I done to communicate the hazard?**

16.5 Speak Up/Listen Up

All AECOM employees have a responsibility to help create the environment where the expectation is Safety for Life. Speak Up/Listen Up (SULU) is a technique to steward jobsite safety by utilizing 4-Sight as a basis for safety feedback conversations. SULU has two main parts:

- **Speak Up** where employees use three simple steps when providing feedback to others about unsafe acts:
  - Ask to discuss their hazard assessment or 4-Sight for the task;
  - Get a commitment from the employee to apply the hazard controls and perform the task according to the accepted procedures; and

  - Follow up to ensure the employee is working safely.

- **Listen Up** where employees use two simple steps when responding to safety feedback:
  - Listen – Focus on the message, not the messenger; and
  - Commit to performing the task the safer way.

SULU conversations should happen consistently throughout the workday to create clear expectations of how work should be performed. All employees should recognize safe work behaviors in order to reinforce them and keep them going. An occasional correction is much more effective when employees are frequently encouraged and positively recognized for their safe actions. Managers and supervisors should be having SULU conversations during site visits and ensure peer to peer and site supervisor to crew SULU conversations are being held.

17. SH&E Event Reporting & Investigation

17.1 Incidents and Near Misses

All incidents and near misses (i.e., incidents without consequences), regardless of type and perceived severity, must be reported in accordance with the Incident Reporting, Notifications and Investigation, S3AM-004-PR1 and entered into **IndustrySafe** (AECOM's SH&E Database) within the timeframes listed below:

Table 17-1: Incident Reporting Timeframes

Incident Type	IndustrySafe Reporting Timeframe
Significant Incident, including any injury to an AECOM employee or Subcontractor	Within **4 hours**
All Other Incidents	Within **24 Hours**

17.2 Investigation

All incidents and near misses will be investigated and documented to determine the contributing and root causes. The investigation will verify the need for corrective actions and identify opportunities for Lessons Learned and continuous improvement. For more information in incident investigations, please review the Incident reporting, Notifications and Investigation procedure, S3AM-004-PR1.

As soon as it is safe to do so after an incident occurs, the following information will be gathered:

- An incident timeline;
- Witness statements;
- Photos of the incident;
- Police reports, if applicable;
- Any additional information that will assist in the investigation; and
- Copies of daily safety documentation and/or field notes.

Note: Only the basic facts, who, what, when, where and how, are needed to complete the initial IndustrySafe report. SH&E Managers will assist you in updating the report as additional information becomes available.

17.3 Audits & Inspections

The AECOM audit and inspection process establishes the protocol for the assessment the Safety, Health and Environment (SH&E) program and its application, as well as the process to identify and monitor corrective actions. The goal is to minimize risk and enhance operational SH&E performance. For more information on audits and inspections, please review the Compliance Assurance procedure, S3AM-216-PR1.

17.3.1 Project Manager Self-Assessment

AECOM Project Managers will perform quarterly SH&E site audits using the DCSA Project Manager Self-Assessment form available in IndustrySafe.

17.3.2 Senior Management Activities (SMAs)

AECOM Senior Managers will perform Senior Management Activity inspections on the projects under their area of responsibility. These SMAs will be entered into Lifeguard.

17.3.3 Project Safety Reviews (PSRs)

AECOM SH&E Managers will perform periodic Project Safety Reviews on projects in their area of responsibility. These PSRs will be entered into IndustrySafe.

17.3.4 Site Safety Inspections (OSHA Type)

AECOM Project Managers and SH&E Managers will perform periodic site safety inspections (OSHA type) on projects in their area of responsibility as required. These site safety inspections will be entered into IndustrySafe.

17.3.5 External Regulatory Inspections

If a regulatory inspector shows up on site, AECOM will follow the requirements in our Regulatory Inspections procedure S3AM-211-PR1.

17.4 Safety Observations

All safety observations must be entered into **IndustrySafe™** **or** **Lifeguard™** (AECOM's SH&E Databases).

17.5 SH&E Database Access

Incidents, near misses, and audits/inspections must be entered into **IndustrySafe™**, which is one of AECOM's SH&E Databases. Safety observations may also be entered into **IndustrySafe™** at the AECOM Project Manager's discretion. **IndustrySafe™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. IndustrySafe may also be accessed from your smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.

Safety observations may also be entered into **Lifeguard™**, which is one of AECOM's SH&E Databases, at the AECOM Project Manager's discretion. **Lifeguard™** can be accessed via the SH&E Page on Ecosystem when you are in the office or connected to the AECOM network via VPN. **Lifeguard™** may also be accessed from your smartphone/device, if equipped with a QR Code Reader App, using the QR Code to the right.

Incidents, Near Misses, Audits/Inspections and Safety Observations

17.6 Reporting Assistance

If your field schedule, access to internet, and/or limited cellular phone coverage have the potential to impact timely incident, near miss, and/or safety observation reporting, please contact your AECOM Project Manager and/or SH&E Manager for assistance.

18. Environmental Management

18.1 Scope

AECOM implements policies and procedures to reduce risk of land and/or water pollution and other environmental concerns during the life of the project. The AECOM Project Manager will ensure compliance with all local, state, federal and client environmental laws and/or regulations. For additional information on Environmental Management, please review the Environmental Compliance procedure, S3AM-204-PR1.

18.2 Roles and Responsibilities

All AECOM staff through the leadership of the AECOM Project Manager are responsible for reducing or eliminating environmental impacts by AECOM personnel. The site supervisor and/or the site safety officer will be immediately notified of any spills, leaks, or other impacts to the ground and/or water, or other environmental emergencies, after emergency respondents have been called, if necessary. The Project Manager will be responsible for making any further notifications as required.

18.3 Staffing and Awareness

AECOM staff will receive relevant awareness training to ensure proper knowledge and training when performing activities with the potential to impact the environment, as well as the requirement of this plan for proper preparedness and response.

18.4 Pollution Prevention

Pollution/impact to the environment could be caused by the following sources:

- Air emissions
- Wastewater
- Hazardous materials
- Solid waste
- Hydrocarbons
- Storm water and sediment/erosion

AECOM will employ prevention and control measures to prevent impacts to the environment. In addition, a spill kit consisting of sorbent socks, pads, shovels, and personal protective equipment (PPE) will be maintained on site by AECOM and each subcontractor. Solid waste will be collected, segregated (recyclable, non-flammable, and flammable) and removed on a regular basis.

19. Project Closeout

Completing a project requires procedures to close out Project Contractual and Administrative activities. The closeout process ensures all documentation is finalized and any Contractual Obligations are met. The Project is ready for close-out once it has been accepted by the end user organization. Project close-out is complete after all physical, regulatory, contractual, and financial close-out activities are complete.

19.1 Health and Safety File

The Health and Safety File will normally include:

- Brief description of the work carried out.
- Residual hazards which remain and how they have been dealt with (e.g. surveys, or information on asbestos, contaminated land, water bearing strata, buried services etc.).
- Key structural principles incorporated in the design (e.g. bracing) safe working loads etc.
- Any hazards associated with the materials used.
- Nature, location, and markings of significant services including underground cables, gas supplies, firefighting etc.
- Information and ‘as built’ drawings including safe access to and from confined spaces etc.
- Daily Tailgate Meeting Forms
- Lessons Learned

20. Personal Acknowledgement

By signing below, the undersigned acknowledges that he/she has reviewed the AECOM Health and Safety Plan for the Iroquois Hunts Point site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work and will comply with the provisions contained therein. The employee understands that they are **NOT** to perform any work that they have not been adequately trained for and that they are to stop work if it is unsafe to proceed. Finally, the employee understands to notify the Site Supervisor and the **Incident Hotline at 800-348-5046** for any incident, ***including ANY injury even if no first aid or medical treatment is required.***

Print Name Clearly	Signature	Organization	Date

20.1 Disclaimer

This HASP, and each of its provisions, is applicable only to, and for use only by, AECOM, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third-party contractors on industrial sites or projects where AECOM is providing engineering, construction management, or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM Corporation shall have no responsibility. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.

AECOM

Attachment A

THA Forms, and Tailgate Safety Meeting Form

Attachment A: THA Forms, and Tailgate Safety Meeting Form

Task Hazard Assessment Instructions:

Each unique task or work group should have their own THAs. If workers have a THA for their task(s) in hand, they should simply review it and document the site-specific edits in the appropriate section. If workers do ***not*** have a THA for all tasks to be performed, a THA must be obtained or drafted *prior to starting work* on that task. Use additional pages as needed.

- Identify the basic steps of the task that must be performed in order and their associated hazards. Identify controls or barriers to mitigate each identified hazard.
- Clearly identify any **STOP WORK** triggers.
- Document stop work and change management if conditions/ scope changes.
- Use 4-Sight to identify and mitigate site-specific hazards throughout the day. Modify the THA as needed. Contact site supervisors or the PM for any significant scope changes or changes of expected conditions.
- All THAs shall be 3 pages (maximum) or less (preferred). If they are longer, the task is too broad.
- All hazards will use standardized nomenclature (Hazard Wheel), should be specific, detail how someone could be hurt and what the outcome could be.
- All actions to mitigate hazards must be specific, clearly aligned with its respective hazard and not generic. Avoid words such as "*proper", "correct*", or "*appropriate*"). Use specifics and numerical values (i.e., wear disposable nitrile gloves, stand back 6 feet/1.8 meters, take a 10-minute break every hour).
- PPE cannot be the only line of defense - PPE is always the last line of defense, so think through what other controls (engineering, administrative, etc.) could mitigate hazards.

Discuss as Applicable and Modify THA as Needed

Check ☑ if reviewed or mark N/A

- ☐ *Biological / Chemical / Electrical Hazards*
- ☐ *Decontamination Procedures*
- ☐ *Ergonomics – Lifting, Body Position*
- ☐ *Lock Out / Tag Out*
- ☐ *Short Service Employees – visual identifier and mentor / oversight assignment*
- ☐ *Simultaneous / Neighboring Operations*
- ☐ *Slip / Trip / Fall Hazards*
- ☐ *Specialized PPE Needs*
- ☐ *Traffic Control*
- ☐ *Waste Management / Decontamination*
- ☐ *Weather Hazards / Heat Stress / Cold Stress*
- ☐ *Work Permit Requirements:* Click here to Identify OR type N/A
- ☐ *Other:* Click here to Describe OR type N/A

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Using the Matrix:

1. Identify basic steps of the task and associated hazards.
2. Calculate the initial risk rating.
3. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating.
4. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics**. This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: **Phone Number:**	
AECOM SH&E Rep. Name: **Phone Number:**	
Meeting Leader:	

DCS Americas - This form may be replaced by the electronic Daily Tailgate Meeting Tool. Link - Ecosystem Daily Tailgate Meeting App Site

Date:	**Project Name/Location:**	**Project Number:**
Today's Scope of Work:		

Muster Point Location:	**First Aid Kit Location:**	**Fire Extinguisher Location:**	**Spill Kit Location:**

1. Required Topics

- ☐ Fitness for Duty requirements, all sign in / sign out
- ☐ Required training (incl. task specific) completed and current
- ☐ SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, preplanning hazard assessments / risk registers, controls, procedures, requirements, etc.)
- ☐ Task Hazard Assessments (THAs) are to be reviewed and completed for each task immediately prior to conducting
- ☐ STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- ☐ Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- ☐ Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- ☐ Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- ☐ Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- ☐ Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- ☐ Required checklists/records available, understood (describe):
- ☐ Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

☑ ■ **Check ☑ as reviewed or mark ■ as not applicable**

- ☐ ☐ Biological/ Chemical / Electrical Hazards
- ☐ ☐ Ergonomics - Lifting, Body Position
- ☐ ☐ Lock Out/ Tag Out
- ☐ ☐ Short Service Employees - visual identifier and mentor/ oversight assignment
- ☐ ☐ Simultaneous/ Neighbouring Operations
- ☐ ☐ Slip/ Trip/ Fall Hazards
- ☐ ☐ Specialized PPE Needs
- ☐ ☐ Traffic Control
- ☐ ☐ Waste Management/ Decontamination
- ☐ ☐ Weather Hazards / Heat Stress / Cold Stress
- ☐ ☐ Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- ☐ ☐ Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- ☐ ☐ Other Topics (describe/attach):
- ☐ ☐ Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	**Signature**	**Date** **Time** (at end of day / shift)

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty and have inspected your required PPE to ensure satisfactory condition.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

Task Hazard Assessment

AECOM Imagine it. Delivered.

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

Project Name:		Client:		Date:	
Permits Required? (list):		Work Location:			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile ☒ Hearing Protection ☐ Other:
Tools & Equipment:	Cutting tools, Hot Work Permit

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
1. Pre-mobilization, Equipment Inspection. Contact One-Call, private utility contractor, and/or site personnel to locate and mark underground utilities.	1a. Injury from equipment malfunction 1b. Failure to have underground utilities identified could result in explosion, electrocution, injury, death, property damage.	5 **10**	1a. Ensure that PM or person responsible for scheduling rental equipment requests that the vendor inspects the equipment prior to site delivery to ensure all appliances are in working order and fit for use. 1b. Call public utility locating service prior to initiating work activities. Use private locating service to mark out areas on private property. Verify location of utility marks; do not perform intrusive work if utility location marks cannot be found or if marks are destroyed. Preserve utility marks as much as possible. Call to have utilities remarked if unsure as to their location. Complete utility checklist form.	4 4
On-Site Edits:				
2. Setup Drill Rig and work zone	**2a**. Struck by vehicle or equipment traffic **2b**. Sprain or broken bones due to slip, trip or fall **2c**. Struck-by, crushed-by, caught-by drill rig.	8 6 **10**	**2a**. Verify that drilling contractor inspects equipment daily using S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection or equivalent. Verify that kill switch on rig is tested and operational. Establish work zone using traffic control devices, signs, cones, etc. in advance of initiating monitoring well abandonment activities. Restrict access to observers and passersby. **2b**. Maintain required housekeeping in work area, do not carry equipment where visibility of ground is impaired, remove or mark all trip hazards in work area. **2c**. Communicate path of movement to all project personnel. Establish and use agreed upon hand signals during spotting activities. Always use a spotter(s) to direct movement of drill rig and watch for vehicle and pedestrian traffic. Additional spotter(s) will be used in high traffic areas and in areas with blind spots where traffic is difficult to observe. Chock	4 2 4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Error! Reference source not found.	**Control #:**	Error! Reference source not found.**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			wheels ensure outriggers/jacks are used.	
	2d. Contact with overhead utilities.	10	**2d**. Keep a minimum of 15 feet from overhead power lines (20 ft. if 230-285 KV, 25 ft. if 285-345 KV, 35 ft. if 345-500 KV) Check HASP to ensure client/site does not have stricter requirements. Mast shall be down when rig is in motion.	4
	2f. Hydraulic failure causing release to the environment.	10	**2f**. Place secondary containment on ground under rig. Ensure that secondary containment is setup with 'berms/barriers' or containment is securely clipped onto the rig tracks/wheels to protect from any fluid leaking off the plastic.	3
On-Site Edits:				
3. Commence drilling	**3a.** Cuts, contusions or broken fingers due to contact with moving parts	6	**3a**. Never place hands, fingers, feet under the bottom of an auger flight, or other location where these heavy items could be set down or could fall suddenly.	2
	3b. Entanglement	10	**3b**. Ensure rotating parts are properly guarded. Remove loose clothing and jewelry that could become entangled in moving parts. Use a long handled shovel to remove cuttings from the auger/rods.	4
	3c. Noise	6	**3c.** Wear hearing protection while equipment is in use.	2
	3d. Back strain/ overexertion when unloading equipment	8	**3d.** Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds.	4
	3e. Contusions to face or eyes due to flying/shattering objects	8	**3e.** Have bystanders maintain a 5 foot distance from the operation at all times. Set up work area the mast plus 5 feet and no less than 30 feet. Wear all required PPE.	4
	3f. Hand positioning/pinch points	8	**3f.** Wear leather or thick puncture-resistant gloves, communication between driller, helpers, and logger. All pinch point hazards should be labeled on rig with warnings.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Error! Reference source not found.	**Control #:**	Error! Reference source not found.**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
4. Inspect grout mixer/pump	**4a.** Personnel, property, and/or equipment damage due to failure to inspect mixer/pump properly	6	**4a.** Read start-up and shutdown procedures shown on grout mixer/pump or read operating manual that accompanies unit. Check all fluid levels if equipped with gas engine. Be familiar with how to shut off mixer/pump in case of an emergency. Check that unit has adequate amount of fuel in the tank. Check all hydraulic hoses and fittings for leaks, wear, and proper connection. Ensure all guards are in place.	2
	4b. Skin irritations or labored breathing due to contact with with fuel	3	**4b.** Never overfill tank due to fuels expanding when heated. Make certain that fuel cap is fastened tight. Wear nitrile gloves underneath leather gloves during inspection	1
On-Site Edits:				
5. Grouting, Installing Well Pad	5a. Exposure to cement dust and mixed cement, skin, eye, and inhalation	6	5a. Wear a dust mask to protect against airborne particles. Wear leather gloves when adding materials to mixing tank. Open bags of dry materials in a controlled manner to minimize dust. Try to stay upwind from grout mixing.	2
	5b. Injury from entanglement in drive shaft or mixing paddles	6	5b. Do not reach into the mixing tank during operation. Do not wear loose clothing or use tools that could become entangled in drive shaft or mixing paddles. Turn the unit off before attempting to service the mixer or clear debris.	2
	5c. Splashes and spills	4	5c. Wear face shield to guard against splashes. Add water or other liquid additives in a controlled manner to avoid splashes. Do not exceed the capacity of the mixing tank	1
	5d. Muscle strain	9	5d. Stage bags of dry materials as close to mixer as possible. Use a buddy to help move heavy bags. If possible, lower the height of mixer to minimize lifting.	3
	5e. Hand injury from opening bags on breakers. Pinch points.	6	5e. Wear leather gloves when placing bags of dry materials onto bag breakers. Do not	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Error! Reference source not found.	**Control #:**	Error! Reference source not found.**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	5f. Cuts or contusions to hands, fingers from assembling well frame	8	place hands between heavy bags and the bag breakers. 5f. Wear cut resistant gloves at all times and watch hand placement to avoid sharp edges and pinch points. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	4
On-Site Edits:				
6. Debris handling and disposal	6a. Cuts and abrasions and pinch points during debris handling	6	6a. Note pinch points and sharp edges on concrete, well vaults, protective casings, metal skirts, and bollard debris and avoid. Don leather gloves	4
On-Site Edits:				
7. Environmental Concerns while on site	7a. Inclement weather	**10**	7a. Check weather forecast daily, have appropriate clothing and gear for weather conditions	6
	7b. Hypothermia	**10**	7b. Discuss symptoms of hypothermia before deployment. Have a means of warming (hot liquids, hand warmers, etc., and a set of dry clothing, etc. available on the vessel. Change into dry clothing if you become wet at cold temperatures.	5
	7c. Heat stress/heat illness	6	7c. Provide drinking water and electrolytes. Have a heat stress control plan (including shelters, work rotation, methods of cooling). Review prevention, symptoms and treatment guidance before deployment.	4
	7d. Sunburn	8	7d. Wear sunscreen and hat, prevent as much solar exposure as possible	5
	7e. Biological Hazards	6	7e. Assess work area for poisonous plants and communicate observations to avoid them. All field clothing and equipment should be thoroughly cleaned, removed and/or segregated from clean clothing, equipment and supplies to avoid transfer of hazardous plants oils and inspects. If contact with poisonous plants or ticks are unavoidable, use controls including the use of disposable (Tyvek) coveralls, insect repellent (23.8% DEET or similar), light colored clothing, barrier creams, and frequent tick checks. All employees should bath immediately following fieldwork and use	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Error! Reference source not found.	**Control #:**	Error! Reference source not found.**01-01-03-07**

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			soaps/ cleansers designed to remove oils associated with poison oak, and conduct a full body tick check using a mirror. If any crew member has a bee allergy, they must have at least one EpiPen properly stored on site.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Error! Reference source not found.	Control #:	Error! Reference source not found.**01-01-03-07**

All Employees:

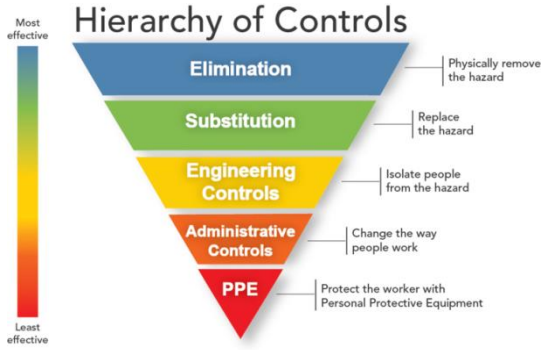
STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



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

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
1.
2.
3.
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7.
8.
9.
10.

Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

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

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☐ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☐ Gloves: Leather / Nitrile ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Emergency kit Communication device (cell phone) Navigation system

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Trip Planning	1a. Unauthorized driving	9	1a. You must be an AECOM authorized driver to drive for AECOM business purposes. Consult the requirements of S3AM-005-PR1. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. Develop a Journey Management Plan if applicable.	4
	1b. Inclement weather	6	1b. Evaluate weather conditions prior to beginning the travel to determine if travel should proceed. Verify your vehicle is equipped to travel in poor weather. Have supplies on hand in the event that you become stranded, including a communication device to call for help.	4
	1c. Getting Lost	6	1c. Review route in advance and program GPS prior to leaving	3
	1d. Inadequate vehicle for the site/trip	7	1d. Understand what type of vehicle is necessary to transport tools & equipment to the site. Know site conditions before departure and obtain proper vehicle, 4-Wheel drive if necessary	4
	1e. Vehicle malfunction	8	1e. Inspect vehicle prior to leaving. Verify that maintenance records are current.	4
On-Site Edits:				
2. Driving	2a. Fatigue	**15**	2a. Start trip well rested & take breaks when needed. Share driving responsibilities where possible. **STOP DRIVING AND PULL OVER** in a safe place if you begin nodding off or showing other signs of fatigue.	4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Driving to and From Site	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
	2b. Risky driving practices	15	2b. Practice defensive driving techniques and avoid bad driving habits • Allow for adequate time to make the trip • Do not speed or attempt to multi-task • Do not use cell phone or text or attempt to program GPS while driving	4
On-Site Edits:				
3. Stops/breaks during transit	3a. Theft of equipment/materials	6	3a. Place any likely theft items out of sight and lock vehicle when leaving it. Do not leave vehicle unattended for longer than necessary. If at all possible, avoid leaving packed vehicles in public parking areas overnight, unload if possible. Park in well lighted areas.	4
	3b. Personal security risk	10	3b. Be alert and aware of surroundings when making stops. Stop at areas which are well lit and have security if possible.	3
On-Site Edits:				
4.	4a.		4a.	
On-Site Edits:				

Additional Notes:

Task Hazard Assessment

AECOM Imagine it. Delivered.

All Employees:

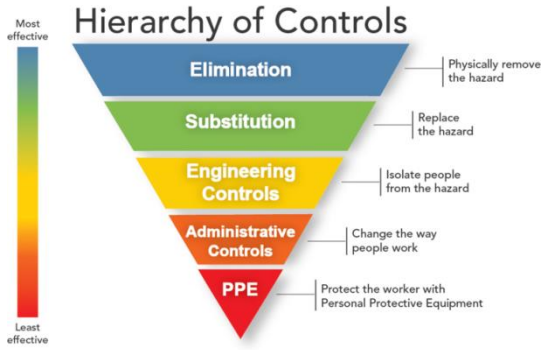
STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



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

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
2.	
3.	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
1.
2.
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com
Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Excavation/Trenching	**Control #:**	01-01-04-01

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ Hi-Vis Vest ☒ Safety Toe Boots ☒ Gloves: Leather work gloves ☒ Hearing Protection ☐ Other:
Tools & Equipment:	Backhoe/excavator Hand tools/shovels Trench box/shoring

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Select the proper tools/equipment for the task at hand.	1a. Struck-by/hit-by	12	1a. There are a lot of options when choosing the proper excavator. Prior to performing the task, the competent person must research, ask questions and be knowledgeable of all of the equipment/machinery available and choose the equipment/machinery that is the safest and most efficient for the scope of work being performed.	3
	1b. Pinch/caught between	8	1b. Inspect the equipment for pinch/crush points and discuss these with site staff.	4
On-Site Edits:				
2. Mobilize to trench/ excavation location	2a. Struck-by, hit-by, caught-between	15	2a. Review and implement the following" • Ensure equipment delivery vehicle is secure from movement while unloading equipment by parking on a flat surface, putting the vehicle in park, setting the emergency break and chocking the wheels. • Provide a secure ramp for offloading the equipment from the delivery vehicle. • Only qualified operators will offload/operate the equipment. • Be aware of other objects, vehicles and overhead lines in the area that could be contacted when moving the equipment around the site. • Always use a spotter (trained in the AECOM spotting procedures) when offloading and moving equipment around the site. • Wear PPE that includes leather work gloves, safety glasses, high-visibility	3

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Excavation/Trenching	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
			vest, hearing protection and a hardhat.	
	2b. Slips, trips, falls	8	2b. Scan the ground ahead, remove all obstacles. Choose the safest path of travel, wear steel toe boots with good traction	4
On-Site Edits:				
3. Inspect all equipment/machinery prior to use.	3a. Equipment/machinery malfunctioning	**15**	3a. Complete equipment inspection checklist, if any deficiencies are found, they must be repaired prior to use or the machine must be taken out of service. Test emergency shutdown devices and guards to assure proper functions.	3
	3b. Pinch/caught between	8	• Follow safe operating procedures in the manufacturer's operating manual. Note and avoid all pinch/crush points and avoid. • Equipment must be shut down with all energy released. • Wear PPE that includes leather work gloves, safety glasses, high-visibility vest, hearing protection and a hardhat.	4
On-Site Edits:				
4. Utility locates and hand clearing.	4a. Contact with a live utility line	**15**	4a. Review and complete all of the following: • Underground utilities shall be located and marked (Call before you dig, One-call, Miss Utility, etc.). If markings are old/faded, must have utility locator come out and remark. • Review drawings and other historic documentation to help identify underground utilities. • Inspect area for discolored/disturbed soil and other visual signs of the presence of underground utilities. • Hand/soft dig within 5 feet of the utility markings. Do NOT dig forcefully or jab digging tools into the ground as they could damage the utility. • Prior to digging, complete the Underground Utilities & Subsurface Installation Clearance Checklist (S3AM-331-FM1).	3
	4b. Struck-by, hit-by	6		2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Excavation/Trenching	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
			4b. Maintain a minimum 5' distance from anyone using hand tools to preclear. Wear at a minimum: hard hat, safety toed work boots with ankle support, safety glasses, ANSI Class II high visibility vest and leather work gloves.	
On-Site Edits:				
5. Soil excavation	5a. Contact, caught-between, struck-by, hit-by equipment	15	5a. To avoid contact with equipment: • Only operators experienced/qualified in excavation/trenching activities will operate equipment. • Exclusion zones will be erected to keep unauthorized personnel out of danger from moving parts and equipment. The exclusion zone will be set back a minimum of 20 feet from the swing radius of the excavator/backhoe. • Personnel will make eye-contact with the operator prior to walking through the exclusion zone. Wear at a minimum: hard hat, safety toed work boots with ankle support, safety glasses, ANSI Class II high visibility vest and leather work gloves.	4
	5b. Trench cave-in, collapse	15	5b. Competent person will inspect excavations/trenches for defects/signs of cave-in potential daily and as conditions change and document these inspections. For excavations 6 feet or greater in depth, personnel must stay a minimum of 6 feet from the edge of the trench/excavation or be protected from falling into the trench/excavation by a personal fall arrest system.	4
	5c. Potential for hazardous/flammable atmosphere	10	5c. If there is the potential for a flammable/hazardous atmosphere, excavations/trenches will be monitored using a 4-Gas meter.	4
On-Site Edits:				
6.	6a.		6a.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Excavation/Trenching	Control #:	Error! Reference source not found.

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Excavation/Trenching	Control #:	Error! Reference source not found.

All Employees:

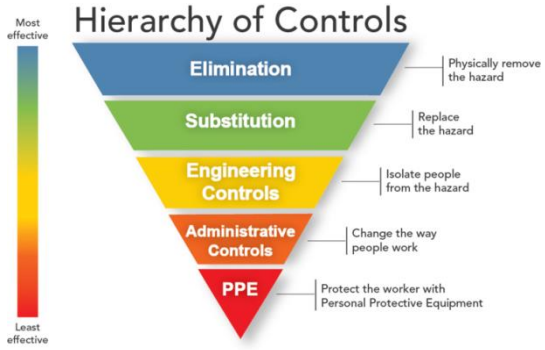
STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



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

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Printed Name	**Signature**
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Task Hazard Assessment

AECOM Imagine it. Delivered.

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

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, cut resistant ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand tools YSI Pump

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Visually clear proposed sampling locations	1a. Exposure to biological hazards: insects, poisonous plants and animals. Injuries could include anaphylactic shock, allergic reactions, rabies.	6	1a. Identify and avoid hazardous plants and animals on site. Look for signs (spider webs, droppings, etc.). Wear cut resistant gloves, insect repellant, use a broom or a rake to move vegetation, not your hand or foot, move slowly	4
	1b. Slip/trips, falls due to uneven terrain resulting in broken bones or torn ligaments.	6	1b. Identify, mark and avoid slip, trip and fall hazards (holes, obstructions protruding from ground, or debris). Contact PM immediately and do not proceed if any conditions are observed that cannot be controlled to make well sampling in the area safe.	4
	1c. Struck by vehicle resulting in severe trauma or death	**10**	1c. Visually inspect roadway for moving equipment if walking and set up vehicle as a barrier if driving. Set up exclusion zone around each well. Don reflective vest.	4
On-Site Edits:				
2. Open well casing/flush-mount covers and well plug lock.	2a. Cuts/lacerations/crushing, bruises	6	2a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers, and feet clear when opening and closing well cover. Inspect ground before kneeling. Don knee pads.	2
	2b. Back strain from improper lifting	4	2b. Stretch before working. DO NOT use awkward positioning. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	2
	2c. Vapor exposure resulting in	4	2c. Stand upwind from the well opening to avoid vapor exposure. Loosen well cap slowly, keeping control if pressure is released due to vapors. Keep face out of line-of-fire.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Groundwater Sampling – Low Flow	**Control #:**	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!			
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
	inhalation hazards or illness			
	2d. Biologic hazards; insects, poisonous plants, and animals	6	2d. Slowly lift the well cover away from person and look for insects underneath the well. Use long handle tool to remove or kill any insects (i.e. screwdriver).	4
On-Site Edits:				
3. Installing tubing in well and setting up equipment.	3a. Cuts/lacerations/crushing, bruises	6	3a. Avoid touching sharp material/edges. Keep face, hands, fingers feet clear when cutting tubing and setting up equipment. Wear cut resistant ANSI 2 gloves with disposable nitrile over gloves	2
On-Site Edits:				
4. Removing tubing from well	4a. Exposure to chemical hazards in groundwater resulting in inhalation hazard or illness	4	4a. Stay upwind to avoid vapor exposure	2
	4b. Cuts/lacerations/bruises to knee (flush mount)	4	4b. Don knee pads and inspect ground before kneeling down and take frequent breaks to stand and stretch	2
On-Site Edits:				
5. Closing well casings/flush mount covers	5a. Cuts/ lacerations/crushing, bruises	4	5a. Avoid touching sharp material/edges. Wear cut resistant ANSI 2 gloves. Keep face, hands, fingers feet clear when closing well cover. Don knee pads and inspect ground before kneeling down.	2
	5b. Back strain from heavy/awkward material handling	4	5b. Keep back straight. Take regular rest/stretch breaks. Change position regularly.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

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

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!			
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				
6. Gather sampling equipment and tools, place in work vehicle	6a. Cuts/lacerations/crushing/bruises from gathering or dropping equipment 6b. Aches and strains from improper lifting	3 4	6a. Maintain a secure grip on equipment and only carry manageable amount of equipment when demobilizing. 6b. Bend and lift with legs. Keep back straight. Take regular rest/stretch breaks. Change position regularly. Team lift is required for items over 50 lbs (or awkward items)	2 2
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

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

All Employees:

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

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

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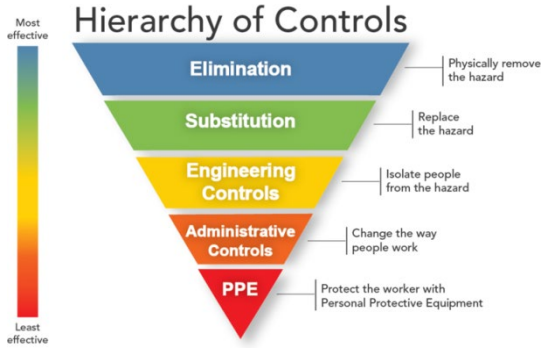
For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



- ***Most hazards need more than one control***
- ***What should you do? Stack your controls***
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Task Hazard Analysis

AECOM Imagine it. Delivered.

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

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Development (with pump)	**Control #:**	01-01-05-02

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather/Nitrile ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Tubing Pump Manhole lifting device Hand Tools

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Inspect and open wells	1a. Pinch points between cover and ground, abrasion while opening lid with ratchet.	4	1a. UtRemove/replace manhole covers so that they do not pinch fingers. Use a hook or other manhole cover device. Wear leather gloves for this task.	2
	1b. Back Strain	6	1b. Utilize proper lifting procedure when removing covers – Bend at the knees and lift with your legs rather than bending/lifting with your back.	2
On-Site Edits:				
2. Attach pump to tubing and lower in well.	2a. Pinch points between pump and well casing	4	2a. Note and avoid pinch points between pump and well casing. Wear coated nitrile gloves, or leather gloves when handling tubing.	2
	2b. Overhead hazards causing injury to body/hands	**10**	2b. Note and avoid overhead hazards. **STOP WORK** if any utility lines could be contacted.	4
	2c. Back strain from lowering pump into well	8	2c. If well is at deeper depth to be performed comfortably by one person it may be necessary to use two people to lower the pump. Use a rope attached to the pump to lower, not the tubing.	4
On-Site Edits:				

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Development	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
3. Pump water from well.	3a. Repetitive motion pumping well.	6	3a. Take frequent breaks as needed to prevent fatigue to shoulder/arm/back muscles caused by surging well. Be aware of the signs/symptoms of repetitive stress injuries and report all symptoms immediately.	2
	3b. Exposure from splashes during pumping activities.	4	3b. Wear additional PPE (Tyvek) if deemed necessary. Wear eye protection, long pants, nitrile gloves, and steel-toed boots.	2
	3c. Spill or release of impacted water.	4	3c. Have spill pillows/socks available to contain any release or impacted water spill.	2
	3d. Slip, trip, fall on wet ground or over pump cord/tubing	6	3d. Wear appropriate PPE (eye protection, long pants, leather gloves, long sleeves, steel-toed boots.	2
	3e. Back strain from moving purge water buckets	6	3e. Use proper lifting technique (lift with the knees) while handling purge water containers/buckets. Secure bucket lids to prevent splashes/spills.	2
On-Site Edits:				
4. Remove pump/tubing from well.	4a. Exposure to contaminants.	4	4a. When removing tubing use nitrile gloves and paper towels (if necessary to wipe down tubing) as removed. Wipe tubing in downward motion.	2
	4b. Overhead/Horizontal hazards.	4	4b. Remove and coil tubing as removed or lay-out on ground surface. Ensure that tubing on ground surface does not hinder any nearby operations.	2
	4c. Back strain.	6	4c. Depending on depth of well, two people may be needed to hold/guide tubing out of the well. Dispose of tubing within a contractor trash bag.	2
On-Site Edits:				
5. Decontamination - Soak/spray durable equipment to prevent cross-contamination between multiple well locations; properly store disposable equipment	5a. Exposure to decontamination chemicals	4	5a. Avoid contact with all decontaminated chemicals (Liquinox, Alconox, Simple Green, methanol, and any other solvents used on development equipment). Store decontaminated equipment in clean dry area. Wear appropriate PPE (eye protection, long sleeves and pants, nitrile gloves, steel-toed boots).	2

Task Hazard Analysis

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Task Name:	Monitoring Well Development	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
On-Site Edits:				
6. Replace well cap and cover	6a. Pinch Points	4	6a. Refer to **1b** and **2a** above.	2
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Monitoring Well Development	Control #:	

All Employees:

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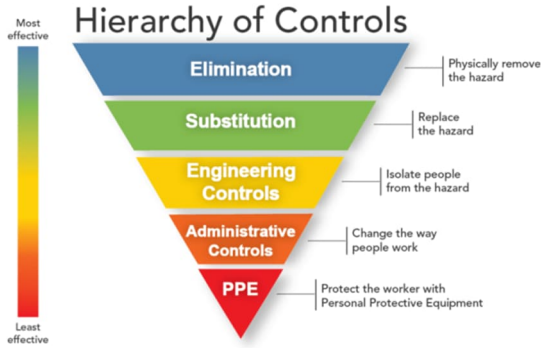

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Task Hazard Analysis

Task Name:	Monitoring Well Development	Control #:	

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling with Hand Auger	**Control #:**	01-01-09-01

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, nitrile, CR ☐ Hearing Protection ☐ Other:
Tools & Equipment:	Hand auger w/extensions Sampling kit

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Setup equipment	1a. Cuts or hand injuries from pinch points	3	1a. Inspect for broken welds on auger. If broken welds or cracks – **STOP WORK**. Wear cut resistant gloves at all times and avoid handling the sharp edges of the auger cup. Keep face, hands, fingers, and feet out of the line of fire of moving parts and tools	2
	1b. Back strain/ overexertion when unloading equipment	4	1b. Stretch before working. Bend and lift with legs and arms, not back. Team-lift any items that are awkward or over 50 pounds. If removing from the back of a truck, slide the case to the tailgate and lift from tailgate and not from the side of the truck bed	2
On-Site Edits:				
2. Advancing hand auger	2a. Contacting utilities causing serious personal injury or death.	**10**	2a. Ensure subsurface clearance protocol and permit requirements are being followed before beginning work. Turn the auger slowly and if refusal is met, remove the auger from the borehole and inspect the cause of refusal. If a utility, pea gravel, or non-native fill material is encountered, **STOP WORK** and call the PM.	4
	2b. Back strain or pulled muscle from rotating hand auger.	6	2b. Do not yank on the auger handle. Do not turn at waist, turn with arms and shoulders, keep feet square and lift with legs, do not work with arms above head. Take breaks and rotate work. Use short extensions as you advance to avoid.	4
	2c. Injury from slip, trip, fall.	4	2c. Clear the work area of trip hazards. Walk around bore hole, never over it and cover hole with delineator when unattended.	3
	2d. Injury to eyes from flying debris.	3	2d. If it is windy, stand upwind and switch to goggles to prevent dirt entering eye.	2

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling with Hand Auger	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
On-Site Edits:				
3. Collecting soil samples	3a. Contact with contaminated soil.	4	3a. Use clean sampler to touch soil. Wear nitrile gloves over the cut resistant gloves at all times. If nitrile tears, stop work and replace glove. For samples with high volatile organics content (PID in breathing zone is constantly above site limits stated in HASP (>5 ppm)) wear breathing protection as stated in HASP. Change Nitriles between samples to avoid cross contamination	2
	3b. Cut from handling auger, sampling tools, jars	6	3b. Inspect containers before and during filling. Do not use if chipped or cracked. Pack containers in coolers so that they will not shift (spacers/ packing materials as needed). Do not over pack coolers.	3
	3c. Muscle strain in back or legs from bending over or squatting	3	3c. Evaluate work surface height (see if chair/ table needed) and sample jar placement to eliminate ergonomic issues. Avoid squatting and bending	2
On-Site Edits:				
4. Adding extensions to auger	4a. Cuts or hand injuries from pinch points	3	4a. Avoid placing hands near connection points of extensions and avoid the sharp edges of the auger cup. Wear cut resistant gloves at all times	2
	4b. Striking another person	3	4b. Check that the swing radius of the auger is clear before moving it	2
	4c. Contacting overhead structure	**10**	4c. Before raising the auger vertically, verify that no overhead lines or structures are present **STOP WORK** and move if electrical lines are in the area	4
On-Site Edits:				
5. Breakdown and decontaminate equipment.	5a. Contact with contaminants and cut hazards	5	5a. Inspect before handling for chips or cracks in glass containers. Wear nitrile gloves over cut resistant gloves. If nitrile tears, stop work and replace glove.	2
	5b. Breaking a sample container resulting in cut, or contact with contents/preservatives	3	5b. Handle containers with care and position over padded or soft surface in case it slips from hand. Place in packing materials that will protect against collisions.	2

Task Hazard Analysis

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Task Name:	Soil Sampling with Hand Auger	Control #:	

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	5c. Striking another person	4	5c. Before disassembling auger, verify that no one is in the swing radius.	3
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling with Hand Auger	Control #:	

All Employees:

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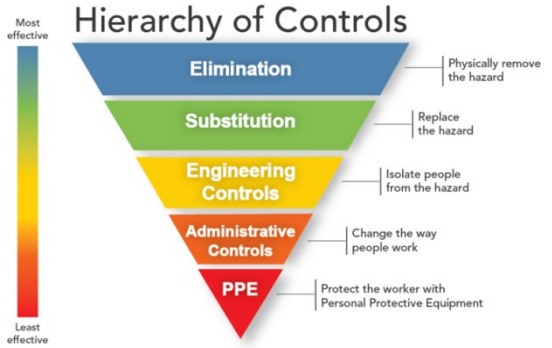
- ***What have I done to communicate the hazards?***

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



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

Worker Sign On	
I participated in the on-site review and fully understand the content of this Task Hazard Assessment.	
Printed Name	**Signature**
1. Supervisor:	
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Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
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Submit a new THA for addition to the DCSA THA Library or send THA improvement suggestions to DCSA.THA.Library@AECOM.com

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Soil Sampling with Hand Auger	Control #:	

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Slug Test	**Control #:**	01-01-05-10

Project Name:		**Client:**		**Date:**	
Permits Required? (list):		**Work Location:**			

This THA must be fully reviewed with all staff members. All job steps, hazards, work practices, and PPE are clearly understood and have been implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: Leather, Nirtrile ☒ Hearing Protection If ambient noise lever > 85dbA ☐ Other: _____
Tools & Equipment:	Transducer, PBC slug or pump Absorbent material Interface probe Carbon bucket

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. 1. Load tools and slug test supplies	**1a**. Injury from exertion, fall, exposure, and contact **1b.** Damage or injury from shifting equipment in transit	6	**1a.** Review list of material required. Load enough supplies and materials for completion of the job to avoid unnecessary trips. ➢ Load vehicle close to materials location in a clear, well-lighted area ➢ Use proper lifting techniques (Bend and lift with the knees, not the back. Get a firm grip and do not twist while lifting the transducer or other objects) ➢ Don work gloves when handling objects. **1b.** Secure objects and supplies prior to travel	4
On-Site Edits:				
2. Access to well vault; remove lock and protective cap from well	**2a**. Pinch points/abrasion **2b**. Exposure to site contaminants and biological hazards **2c.** Inhalation injury from organic vapor, risk of fire or explosion from elevated organic vapor levels.	6 6 **10**	**2a**. Wear leather or similar work gloves while removing locks or opening well caps. **2b**. Don appropriate PPE (i.e., nitrile gloves). ➢ Inspect well cap for insects (i.e., bees, etc.). ➢ Use insect spray if needed. **2c**. Review and understand action levels in the HASP. ➢ Monitor breathing zone of workers with PID if product odors are present. ➢ Monitor any enclosure with PID if product odors are present. ➢ Ensure Level C PPE is available for potential upgrade as required in the HASP	4 4 4

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Slug Test	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions To Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
On-Site Edits:				
3 . Introduce transducer, PVC slug, or pump into well to change water level elevation and collect readings	**3a.** Exposure to site contaminants **3b**. Exertion resulting in muscle strain / sprain	10 8	**3a.** See 2c. above. **3b**. Use proper lifting techniques, do not lift > 50 pounds without assistance.	4 4
On-Site Edits:				
4. Introduce the PVC slug. ***Note:*** *The PVC slug must remain submerged for a falling head slug test or remove the PVC slug for a rising head slug test.*	**4a**. Exposure to site contaminants **4b**. Exertion **4c**. Product release	10 8 8	**4a.** See 2c. above **4b.** See 3b. above Use proper lifting techniques that consists of bending at the knees and lifting with your legs while maintaining your back in a straight position. ➢ Wear PPE including gloves when handling transducer and other equipment and supplies. **4c.** Place absorbent pads around well	4 4 4
On-Site Edits:				
5. Demobilize to next location or complete scope; Retrieve transducer, PVC slug, or pump if applicable from the well	**5a.** Muscle Strain and Sprain form Exertion **5b.** Exposure to groundwater contaminate **5c.** Exposure to decontaminating materials	6 8 6	**5a.**See 3b. above **5b.** Avoid splashing. Pull pump slowly. Wear nitrile gloves, safety glasses, long sleeve shirt **5c.** As above	4 4 4
On-Site Edits:				
	6a.		6a.	

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Slug Test	Control #:	

REMINDER: Use 4-Sight at the start of, and continuously throughout the job/task to identify additional and/or hazards to act on!				
Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
On-Site Edits:				

Additional Notes:

Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Slug Test	Control #:	

All Employees:

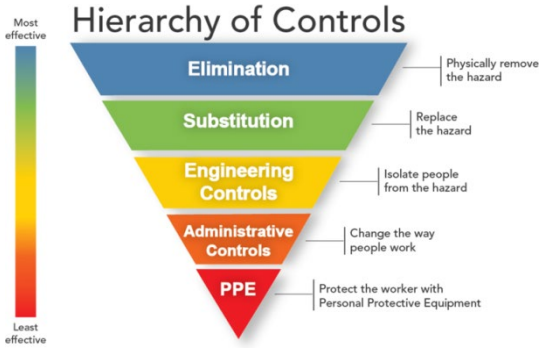
STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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

Use **4-Sight**, AECOM's last minute risk assessment process continuously throughout the day by asking yourself and your co-workers to assess your task, hazards, and mitigations. Amend the THA when needed.

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

For a more thorough identification of hazards, ask "What else could go wrong?" using the Hazard Categories



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Task Hazard Analysis

AECOM Imagine it. Delivered.

Task Name:	Slug Test	Control #:	

Include a copy of the new THA or a photo of the THA modifications as appropriate.

Attachment B

Applicable AECOM SHE Procedures

Attachment B: Applicable AECOM SHE Procedures

	Hazard/ Activity (Note: Text in this column links to procedure)	Applicable Procedure		Hazard / Activity (Note: Text in this column links to procedure)	Applicable Procedure
☐	Abrasive Blasting	S3AM-335-PR1	☐	Highway and Road Work	S3AM-306-PR1
☐	Aerial Work Platforms	S3AM-323-PR1	☐	Hoists Elevators and Conveyors	S3AM-343-PR1
☐	All-Terrain Vehicles	S3AM-319-PR1	☐	Hot Work	S3AM-332-PR1
☐	Blasting and Explosives	S3AM-336-PR1	☐	Ladders	S3AM-312-PR1
☐	Bloodborne Pathogens	S3AM-111-PR1	☐	Lockout Tagout	S3AM-325-PR1
☐	Cofferdams	S3AM-344-PR1	☐	Machine Guarding Safe Work Practice	S3AM-326-PR1
☐	Cold Stress	S3AM-112-PR1	☐	Marine Safety and Vessel Operations	S3AM-333-PR1
☐	Compressed Air Systems & Testing	S3AM-337-PR1	☐	Material Storage	S3AM-316-PR1
☐	Compressed Gases	S3AM-114-PR1	☐	Mine Site Activities	S3AM-341-PR1
☐	Concrete Work	S3AM-338-PR1	☐	Mining Operations	S3AM-345-PR1
☐	Confined Spaces	S3AM-301-PR1	☒	Non Ionizing Radiation	S3AM-121-PR1
☐	Corrosive Reactive Materials	S3AM-125-PR1	☒	Overhead Lines	S3AM-322-PR1
☐	Cranes and Lifting Devices	S3AM-310-PR1	☐	Powder-Actuated Tools	S3AM-327-PR1
☐	Demolition	S3AM-339-PR1	☐	Powered Industrial Trucks	S3AM-324-PR1
☐	Diving (scientific and commercial)	S3AM-334-PR1	☐	Radiation	S3AM-120-PR1
☒	Drilling, Boring & Direct Push Probing	S3AM-321-PR1	☐	Railroad Safety	S3AM-329-PR1
☐	Electrical Safety	S3AM-302-PR1	☐	Respiratory Protection	S3AM-123-PR1
☐	Excavation	S3AM-303-PR1	☐	Scaffolding	S3AM-311-PR1
☐	Fall Protection	S3AM-304-PR1	☐	Steel Erection	S3AM-340-PR1
☐	Flammable and Combustible Liquids	S3AM-126-PR1	☐	Temp. Floors, Stairs, Railings, Toe-boards	S3AM-342-PR1
☐	Gauge Source Radiation	S3AM-122-PR1	☒	Underground Utilities	S3AM-331-PR1
☒	Hand and Power Tools	S3AM-305-PR1	☐	Underground Work	S3AM-330-PR1
☐	Hazardous Waste Operations	S3AM-117-PR1	☒	Wildlife, Plants and Insects	S3AM-313-PR1
☒	Heat Stress	S3AM-113-PR1	☐	Working Alone	S3AM-314-PR1
☒	Heavy Equipment	S3AM-309-PR1	☐	Working On and Near Water	S3AM-315-PR1
☐	High Altitude	S3AM-124-PR1			

Americas

Driving

S3AM-005-PR1

1.0 Purpose and Scope

1.1 The purpose of this document is to establish policies and procedures for operation of AECOM-owned, rented, or leased vehicles, client or customer-owned vehicles, and personal vehicles used by AECOM employees.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content. Policies and procedures related to the operation of commercial motor vehicles are in addition to this procedure; refer to *S3AM-320-PR1 Commercial Motor Vehicles.*

2.0 Terms and Definitions

2.1 **AECOM Business** – Any activity that is performed in the name of AECOM. This includes, but is not limited to, vehicle travel between work locations, client sites, meeting locations as well as driving performed as a part of work-related travel (e.g., driving to and from airports, hotels, train stations). AECOM business does not include driving that is a part of a daily routine commute from home to an AECOM location.

2.2 **Authorized Driver** – AECOM employees who receive manager approval following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducting AECOM business. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. There are three categories of Authorized Drivers;

- Professional (AECOM employee who operates a commercial motor vehicle. Please refer to *S3AM-320-PR1 Commercial Motor Vehicles*).
- Hired (Employee's specific AECOM role is to drive employees in a normal street vehicle, which may or may not require commercial licensing by the applicable authorities. This category does not include busses or vans with a capacity of more than 12 people.).
- General (Driving is required as a part of the employee's job duties. This includes driving AECOM-owned, leased, or rented vehicles, client or customer-owned vehicles, or personal vehicles on AECOM business).

2.3 **Collision** – Any incident in which a motor vehicle that (whether in motion, temporarily stopped, or parked) makes contact with another vehicle or pedestrian, or results in property damage and/or bodily injury, regardless of who was injured, what property was damaged, or who was responsible.

2.4 **Commercial Motor Vehicle (CMV)** – Any self-propelled or towed motor vehicle used for AECOM business (e.g., to transport passengers or property) when the vehicle is one of the following:

- Has a gross vehicle weight rating (GVWR) or gross combination weight rating equal to or greater than the weight specified by the applicable jurisdiction (e.g.,U.S. $\geq$ 10,001 pounds [4,536 kilograms]); or
- Is designed or used to transport more than the number of passengers specified by the applicable jurisdiction, including the driver, for compensation; or
- Is designed or used to transport more than the number of passengers specified by the applicable jurisdiction, including the driver, and is not used to transport passengers for compensation; or
- Is used in transporting hazardous material in quantities ≥ 1,001 pounds (454 kilograms) combined total weight at any time.
- Refer to *S3AM-320-PR1 Commercial Motor Vehicles* for additional information.

2.5 **Distracted Driving** – An activity that takes the driver's attention away from the primary task of driving.

2.6 **Driving Under the Influence (DUI)/Driving While Intoxicated (DWI)** – The operation of a vehicle while under the influence of alcohol, drugs, medications, or other substances capable of inducing an altered mental state and/or impairing physical and mental judgments, such that the influence of the substances produces impairment in violation of the applicable governmental laws.

2.7 **Fatigue** – A general term used to describe the experience of being "sleepy", "tired" or "exhausted". The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

2.8 **Incident** – For the purposes of this procedure, a vehicle collision or other event where personal injury or property damage occurs, or where a citation is issued while the employee is on AECOM business. This may also include acts of theft, vandalism, and criminal mischief.

2.9 **Journey Management** – A process for planning and executing necessary journeys safely.

2.10 **Local Laws** – Signs, postings, laws, regulations, ordinances and codes applicable for the jurisdiction in which the motor vehicle is being operated.

2.11 **Motor Vehicle Report (MVR) / Driver's Abstract** – A listing of the tickets (violations), incidents collision for an individual driver over a period of time (e.g., 3 years, 5 years) provided by a state or provincial authority such as the Department of Motor Vehicles.

2.12 **Personal Vehicle** – A motorized vehicle owned or leased by an employee.

2.13 **Portable Electronic Device** – A mobile electronic device that is used to receive or communicate voice, email, internet, and/or public media. The device requires user interaction (typing, dialing, reading, keying, etc.) that distracts the motor vehicle operator. Example devices include, but are not limited to:

- Mobile Communication Devices (MCD)
  - Mobile/Cellular phones
  - Two-way Radios
- Personal Data Assistant (PDA)
- iPads, iPods, or other tablet models
- Computers
- Global Positioning System (GPS) receivers

2.14 **Spotters –** Extra personnel that may provide guidance when maneuvering in close and/or complex situations in order to avoid the occurrence of an incident.

2.15 **Task Hazard Analysis (THA)** – A tool for evaluating work activities for the purpose of:

- Identifying the SH&E hazards and risks associated with the activity being performed;
- Identifying and implementing control measures to eliminate or reduce hazards and risks; and,
- Evaluating the effectiveness of control measures and making modifications as needed.

3.0 References

3.1 AECOM Global Travel Policy

3.2 RS2-001-PR Firearms Standard

3.3 S3AM-003-PR1 SH&E Training

3.4 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.5 S3AM-009-PR1 Fatigue Management

3.6 S3AM-010-PR1 Emergency Response Planning

3.7 S3AM-209-PR1 Risk Assessment & Management

3.8 S3AM-314-PR1 Working Alone

3.9 S3AM-319-PR1 All-Terrain Vehicles

3.10 S3AM-320-PR1 Commercial Motor Vehicles

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Confirming employees are informed of the provisions of this procedure and related vehicle procedures.
- Providing a copy of this procedure to an employee who will be driving an AECOM-owned, leased or personal vehicle for AECOM business.
- Allowing employees to designate time to complete required driving safety training, vehicle inspections and related activities.
- Assigning driving tasks to authorized employees only.
- Selecting and providing vehicles for use by authorized employees that are appropriate for the planned working conditions and environment.
- Supporting employees in the reporting of vehicle incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations,* including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Confirm notification of AECOM Human Resources and Counsel upon receipt by an employee of a legal summons associated with a moving violation related to the use of a company vehicle.

4.1.2 **Employee**

- Follow this procedure and applicable laws while operating a vehicle.
- Complete assigned driver safety training based on the training matrix and any additional training assessments developed at the business group. Refer to *S3AM-003-PR1 SH&E Training, including S3AM-003-FM1 SH&E Training Matrix.*
- Report to the Manager / Supervisor if the vehicle selected is not appropriate for the working conditions and environment.
- Report to the Manager / Supervisor if the employee is inexperienced in operating the type of vehicle assigned.
- Report to the Manager / Supervisor if the employee is inexperienced in driving in the type of working conditions and environment assigned.
- Review the completed Task Hazard Assessment and complete journey management. If required, document the Journey Management Plan using *S3AM-005-FM1 Journey Management Plan* or equivalent.
- Immediately report vehicle incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations*, including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Notify the appropriate Manager / Supervisor and SH&E Manager upon receipt of a legal summons associated with a moving violation related to the use of a company vehicle.
- Immediately report a change or limitation(s) to his/her Driver's License to the appropriate AECOM Human Resources representative or his/her Manager / Supervisor.

- Conducting a pre-operational inspection of the vehicle for damage or deficiencies and reporting discovered deficiencies affecting the safe operation of the motor vehicle to the appropriate authority (e.g., supervisor, rental car agency, etc.).

4.1.3 **SH&E Manager**

- Maintaining and updating training resources for vehicle and driver safety.
- Providing guidance.
- Assisting operational leaders with determining the risk incurred by the use of motor vehicles.
- Assist in the incident investigation and review process.

4.2 General Procedures and Practices

4.2.1 Only Authorized Drivers are to operate a motor vehicle (rental, personal, client or customer-owned, or AECOM-owned/leased) while on AECOM business.

4.2.2 Drivers must comply with *AECOM's Global Travel Policy* and applicable laws, and employ safe driving practices. (NOTE: *Individual state, provincial, and local laws vary*.) Refer to *S3AM-005-ATT1 Authorized Driver Safety Practices*.

4.2.3 Authorized Drivers shall confirm their operating license is on their person, and valid registration and insurance is maintained with the respective vehicle prior to operation.

4.2.4 All local laws including, signs, postings, regulations, ordinances, and codes applicable for the jurisdiction in which the motor vehicle is being operated shall be adhered to.

4.2.5 At-risk driving behavior by AECOM employees shall be identified and managed accordingly.

4.2.6 Authorized Drivers must be at least 18 years of age (noncommercial license) or 21 years of age (commercial license) and have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency). Employees with conditional licenses are prohibited from operating vehicles on AECOM business.

4.2.7 If an Authorized Driver receives a citation resulting in their license being suspended, has his/her driver's license revoked, or is otherwise unauthorized to drive, he/she shall notify the appropriate AECOM Human Resources representative or his/her Manager prior to start of the following work day. Failure to do this may result in disciplinary action up to and including termination.

4.2.8 The office to which the vehicles are registered is liable for any damages to the vehicle being operated by an Authorized Driver.

4.2.9 Seat belts are to be worn by the occupants. The number of passengers shall not exceed the manufacturer's specifications for the vehicle.

4.2.10 The vehicle may not move until all passengers have fastened their restraints in the proper manner (e.g., lap belt secured and shoulder harness placed over the shoulder). Vehicles are not to be operated or used by AECOM employees if seatbelts are not included as part of the vehicle's safety equipment.

4.2.11 The vehicle's engine is to be turned off during refueling. Smoking or cellular phone use is not allowed while refueling.

4.2.12 Motorcycles may not be operated on AECOM business unless the following requirements are met:

- Specific approval is provided by the Supervisor with concurrence from the SH&E Manager.
- A hazard analysis is completed.
- Required training and license is in place.
- Headlights or daytime running lights will be used when the vehicle is in operation.
- A Class 2 or 3 safety vest and appropriate helmet shall be worn while operating a motorcycle.

4.2.13 When practical, drivers should travel during daylight hours and avoid driving during adverse weather conditions. Drivers should also inform colleagues of their travel itinerary including destination and anticipated departure and arrival times.

4.2.14 Fire arms and weapons are not permitted in AECOM-owned, leased or rented vehicles insured by AECOM. Firearms and weapons in personal vehicles are subject to the laws and regulations of the respective local, provincial, state, territory, federal and region and/or country. Refer to the *RS2-001-PR1 Firearms Standard*.

- Exceptions to this standard may exist where there is a credible and demonstrated risk to AECOM employees or assets, or when knives or weapons are required as part of the work activity. Under such circumstances, the exception must be approved by the Chief Resilience Officer, and must strictly adhere to the procedures set forth by the Global Resilience Group.

4.2.15 Vehicles are to be selected based on the nature of planned use. In some working conditions, specialized vehicles, such as four-wheel drive and higher clearance vehicle, may be required to confirm safe travel. These specialized vehicle requirements/specifications shall be identified in the project specific SH&E Plan and/or THA.

4.2.16 Vehicles are to be maintained according to manufacturer's specifications and the applicable environmental and operating factors (e.g. winterized with appropriate fluids, winter tires installed, appropriate coolant for hot climates, etc.).

4.2.17 Vehicles are to be outfitted with the appropriate support equipment based on the THA or client vehicle specifications. Support equipment may include, but is not limited to, cones, rotating warning lights, warning flags, vehicle identification (magnetic door signs or similar), wheel chocks, cargo nets, and rollover protection.

4.2.18 Drivers are to operate vehicles in a manner that avoids situations where backing is necessary. Whenever possible and as permitted, reverse parking of all vehicles while on business is required. A spotter shall be used when backing of trucks and heavy equipment presents a risk of collision.

4.2.19 Non-AECOM drivers (those other than AECOM employees [e.g., subcontractors, joint venture partners, clients, etc.]) are prohibited from operating an AECOM company owned, leased or rented vehicle unless the activity is specifically agreed to in the applicable contract and only if the use of the vehicle is consistent with the terms of the contract.

4.2.20 Authorized drivers required to operate vehicles with special hazards (e.g., trucks carrying fuel cells, vehicles used to tow trailers, vehicles with limited visibility, etc.) will be thoroughly briefed on the hazards and control measures necessary for safe operation of the vehicle. The local AECOM operation will maintain documentation of the briefing.

4.2.21 Define specific vehicle travel routes and parking areas at field sites through the use of fencing, cones, or other markings.

4.2.22 When a vehicle will be left unattended without an authorized driver in the driver's seat, the vehicle must be turned off, placed into park (or gear for manual transmissions), and the emergency brake set. When parked on a grade, the wheels or tracks of mobile equipment shall be either chocked or turned into a bank.

4.3 Distracted Driving

4.3.1 Distractions while driving are a major cause of incidents. Distractions include the use of cellular phones (including texting), eating, drinking, smoking, and engaging in intense conversations. AECOM Authorized Drivers must exercise proper control of the vehicle at all times, including the management of possibly distracting actions and behaviors.

4.3.2 The use of portable electronic devices that may distract the driver while driving is prohibited. This includes cell phones, two-way radios and other items whether hand-held or hands-free. Electronic devices include, but are not limited to, all mobile phones pagers, iPods, MP3s, GPS units, DVD players, tablets laptops and other portable electronic devices that can cause driver distraction.

- Employees shall not use a personal or company mobile communication devices (MCD) while driving any vehicle on AECOM business.
- Employees shall not use a company MCD while driving a personal vehicle.
- Driving includes the time spent in traffic or while stopped at red lights or stop signs.

4.3.3 GPS units and devices (e.g., smart phones, tablets) used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Note: windshield mounting brackets are not permitted in many jurisdictions, with dashboard mounts being acceptable. Consult jurisdictional requirements.

4.3.4 Electronic devices shall be setup for operation prior to commencing driving activities and shall not be changed by the driver while driving.

4.4 Impairment

4.4.1 Impairment can take many forms ranging from fatigue, to the use of prescription medication or alcohol (even small amounts), to the abuse use of illegal and legal drugs and alcohol. AECOM employees shall not drive in an impaired condition.

4.4.2 AECOM employees are prohibited from being under the influence of alcohol or drugs or improperly using medication in a way that could diminish, or raise questions concerning, an employee's ability to perform at his or her best while performing services for or on behalf of AECOM. Operation of vehicles while under the influence may void insurance coverage.

4.4.3 Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another healthcare provider, or the manufacturer (e.g., instructions on the label) the medication could render the activity unsafe.

4.4.4 AECOM employees are prohibited from operating a vehicle if they are experiencing signs and symptoms of fatigue. Employees should stop work and rest before driving. No employee should operate a vehicle if they have worked 14 consecutive hours within a 24 hour period. Refer to *S3AM-009-PR1 Fatigue Management*.

4.5 Journey Management

4.5.1 When practical, alternatives to road travel should be evaluated including teleconferencing/video conferencing, the use of public transportation or carpooling.

4.5.2 Journey management is a process for planning and executing necessary journeys safely and may or may not be documented. Review the completed THA and complete the journey management process. If required, document a Journey Management Plan (JMP) using *S3AM-005-FM1 Journey Management Plan* or equivalent. The journey management process includes the following steps:

- Determining if the trip is necessary.
- Evaluating alternative safer modes of transport.
- Evaluating the potential to combine journeys with others.
- Planning the trip.
- Select the safest and most efficient route. Confirm compliance with any site specific specified routes, route rules, or restrictions.
- Confirm route planning factors in fatigue management. Refer to *S3AM-009-PR1 Fatigue Management*.
- Review road conditions and potential hazards associated with the route.
- Review weather conditions and forecast.
- If applicable, review *S3AM-314-PR1 Working Alone*.
- Confirm Emergency Response Plan includes procedures to be taken in the event of a collision or vehicle incident.
- Allow for adequate travel time.
- Inform others of destination, estimated time of arrival and routing.

4.5.3 Drivers who are to undertake trips in excess of 250 miles (400 km) each way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a JMP. This plan typically includes the route, location of route hazards, timing, rest periods and locations, communications, emergency response and security arrangements.

4.5.4 Drivers are responsible for developing the JMP and coordinating with the applicable parties identified in the plan.

4.6 Driver Safety Training

Authorized drivers shall have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency).

Driver safety training is to be assigned based on the risks posed with the work environment, driver type and vehicle type, using the training matrix and any additional training assessments developed at the business group level. Refer to *S3AM-003-PR1 SH&E Training, including S3AM-003-FM1 SH&E Training Matrix*. A determination of training type is at the discretion of the Manager / Supervisor, with the following guidance applied.

4.6.1 All Authorized Drivers (Professional, Hired, and General Drivers) shall be trained in this procedure; *S3AM-005-PR1 Driving*.

4.6.2 All Authorized Professional Drivers shall be trained in *S3AM-320-PR1 Commercial Motor Vehicles.*

4.6.3 Vehicle / Driver Safety Training

- Recommended for all employees who drive on behalf of AECOM (Professional, Hired and General Drivers).
- This may be completed online (e.g., AECOM University – Driver Safety).
- Recommended to be completed within 1 month of the Authorized Driver's hire date.

4.6.4 Defensive Driver (online) Training

- Recommended for all Authorized Drivers (Professional, Hired, and General Drivers) who are assigned an AECOM company owned, leased or rented vehicle for a significant period of time with the expectation that the employee utilizes the vehicle on a regular basis for AECOM business.
- It is recommended that authorized drivers who have completed web-based defensive driver training or equivalent also complete a refresher every three years.
- Defensive Driver training is available online through AECOM University (e.g., Alert Driving Basic, Alert Driving Skills) or one of the following AECOM-approved training resources:
  - The National Safety Council
  - Alert Driving

4.6.5 Defensive Driver (hands-on) Training

- Recommended for all Authorized Professional Drivers and Authorized Hired Drivers.
- Recommended for Authorized General Drivers who drive in remote locations, hazardous environments (such as refineries, ports, terminals etc.), at-risk drivers, and when required by clients.
- Defensive Driver hands-on training is provided through an AECOM-approved training resource, such as Smith Systems.
- Hands on defensive driver training may be required as a result of an incident or negative Motor Vehicle Report.

4.6.6 Driver Retraining

- Drivers involved in repeated motor vehicle incidents, incidents of sufficient severity or concern, or drivers identified as at-risk through review of their Motor Vehicle Report/Driver Abstract may

be retrained or, as applicable, subject to disciplinary action and refused the right to drive on behalf of AECOM.

- Retraining programs will be implemented at the discretion of the Supervisor and SH&E Manager.
- Employees eligible to continue driving shall be subject to a driver retraining program that may include any of the above programs or other training programs appropriate for the type of driving the employees performs.

4.6.7 Special Vehicles and Driving Conditions

- Vehicles such as All-Terrain Vehicles (ATVs), four wheel drive vehicles, motorized carts, snowmobiles, box vans and trailers (towing) require specialized training and supervision. For ATVs, Refer to *S3AM-319-PR1 All-Terrain Vehicles* for additional information.
- Use of these types of vehicles is limited to AECOM projects, therefore training and qualification programs for drivers will be project specific. The Manager / Supervisor shall work with the SH&E Manager to tailor training to the specific needs of the project.

4.7 Personal Vehicles (additional requirements)

4.7.1 The requirements of this procedure apply to the use of a personal vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.7.2 Personal vehicles driven by Authorized Drivers for business use must satisfy the jurisdiction's registration and inspection requirements and may not be modified beyond manufacturer's specifications.

4.8 Rental Vehicles (additional requirements)

4.8.1 The requirements of this procedure apply to the use of a rental vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.9 Requirements for Authorized Drivers

4.9.1 Review the *S3AM-005-ATT1 Authorized Driver Safety Practices* for specifics.

4.9.2 Drivers are not to permit unauthorized persons to operate an AECOM-owned/leased/rented vehicle.

4.9.3 All Authorized Drivers shall perform a walk-around inspection of the vehicle prior to operation.

4.9.4 Pre-operation vehicle inspections shall be performed and documented by all Authorized Professional Drivers and all Authorized Hired Drivers. A sample vehicle inspection checklist is provided in *S3AM-005-FM2 Vehicle Inspection Checklist*.

4.9.5 Vehicles with deficiencies that affect or could potentially affect the safe operation of the vehicle shall be removed from service and promptly repaired as necessary to permit safe vehicle operation.

4.9.6 As applicable, arrange for and/or coordinate with appropriate AECOM personnel to facilitate preventive maintenance services for the vehicle. Maintain it in sound mechanical condition, as per the manufacturer's recommendations provided in the owner's manual.

4.9.7 Do not operate the vehicle if unsafe maintenance conditions exist that would likely result in vehicle damage or personal injury. This applies to vehicles owned or leased by AECOM and to personally-owned vehicles used for AECOM business. Escalate other maintenance issues for correction to appropriate authority (e.g., manager, rental car agency, supervisor, etc.).

4.9.8 Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service. Only drive vehicles in conditions for which the driver has the appropriate training and experience.

4.9.9 AECOM-owned, rented, or leased vehicles are for official business use only and are not to be used for personal activities. Exceptions to this requirement can be made only with the specific written approval of the Manager of the office or location the vehicle is registered to.

4.9.10 Smoking (including the use of e-cigarettes) and chewing tobacco is not permitted in AECOM-owned, leased or rented vehicles.

4.9.11 Drivers are responsible for damage caused by abuse of the vehicle.

4.9.12 Secure the vehicle when left unattended.

4.9.13 Securing loads in the inside and outside compartments of the vehicle.

- Do not rely on weight/shape of load alone. Always use a cargo net, straps, containers or other mechanical device when necessary to confirm load is secure.
- Mark loads that extend the beyond the end of truck, trailer or similar edge with a red warning flag of at least 16 square inches.
- Red lights will be utilized at night to mark loads that extend the beyond the end of truck, trailer or similar edge.

4.9.14 Do not modify existing equipment (warning sounds, backing alarms etc.) or install aftermarket equipment including toolboxes, truck caps, specialty lights, or towing equipment) without approval from the Manager of the office or location the vehicle is registered to and AECOM Procurement Department.

4.10 Emergency Preparedness

4.10.1 AECOM-owned or leased vehicles are to have a “Safety Kit” that contains a first-aid kit, portable fire extinguisher, safety triangle, and two reflective safety vests. If not available, contact the Manager / Supervisor or SH&E Manager to determine how to obtain a kit.

4.10.2 The following suggested items should be kept in vehicles used for AECOM business in remote project locations:

- First aid kit, appropriate to the work and crew size, or per regulations.
- Fire extinguisher, safety triangle, and safety vest.
- Emergency equipment (e.g., flares, flashlight, blanket, drinking water, etc.) based on conditions.
- Means of communication (cell phone, radio or satellite phone), extra batteries or a charger.

4.10.3 To the extent possible, employees should refrain from changing tires or making repairs to vehicles in the field.

- A road side assistance service should be identified for vehicles used for AECOM business in advance travel.
- If changing tires or making repairs to vehicles is necessary in the field, assessment of hazards shall be completed and all applicable safe procedures and manufacturer’s specifications shall be followed.

4.10.4 Specific emergency procedures are to be identified in the applicable Emergency Response Plan, JMP or the THA. Refer to *S3AM-010-PR1 Emergency Response Planning*.

4.11 Vehicle Incidents

4.11.1 Vehicle incidents are to be reported and managed in accordance with *S3AM-004-PR1 Incident Reporting, Notifications and Investigation* regardless of how minor the incident might be.

4.11.2 The Employee(s) involved in a collision shall follow the below guidelines:

- Assess the situation to confirm everyone is safe, and remove any vehicle occupants from harm’s way. Call, or have someone else call 911 immediately, if necessary.
- As appropriate, remain at the scene of a collision to contact the police. Ask another motorist to call the police if necessary; never leave the scene of a collision.

- As applicable, provide (if requested) to police and the other driver(s) the liability insurance information. Obtain the officer's jurisdiction, name, and badge number and a copy of the police report.
- As applicable, consider moving the vehicle out of the traffic flow if it is safe to do so, the vehicle is operational, and/or no further damage to the vehicle can occur.
- Do not operate a damaged vehicle if its safety is questionable, its operating condition is illegal by applicable laws or its condition is such that further damage would likely result from its operation.
- Turn on the vehicle's flashers to warn other motorists.
- Obtain:
  - Names, phone numbers, and addresses of owner(s), driver(s), and occupants of the other car(s) involved.
  - Other party's insurance company's name, address, phone number, policy number, and insurance agent.
  - Names, phone numbers, and addresses of all witnesses.
  - Photographs of the accident scene when safe to do so.
- Cooperate with AECOM Counsel if the incident results in unresolved risks or third party claims, or if the employee receives a summons, complaint or other legal documents relating to a traffic incident.
- DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.
  - Statements made in haste or anger may be legally damaging.
  - If contacted by a third party, do not answer any questions. Immediately report this contact to the Manager / Supervisor and/or Legal Counsel
- Employees shall report the incident to AECOM's Global Travel Department. If the incident involved a third party, the driver is responsible for obtaining a copy of the police report and providing to global travel

4.11.3 Employees must cooperate with the incident investigation team during any investigation of an incident meeting the investigation protocol.

4.11.4 Vehicle repairs shall be conducted at the authorization of the Manager / Supervisor.

4.12 Drug and Alcohol Testing

4.12.1 Testing for Alcohol and/or Drugs procedures shall be administered in accordance with the applicable policy and procedures. Refer to *S3AM-019-PR1 Substance Abuse Prevention.*

4.12.2 In the event that a police/regulatory officer responding to a vehicle incident administers field and/or laboratory impairment testing AECOM reserves the right, as permitted, to obtain copies of such testing results for inclusion in the incident report and consideration in a subsequent incident investigation.

4.13 Driving Privileges, Citations and Violations

4.13.1 A violation of this vehicle safety standard is subject review by the appropriate AECOM Human Resources representative and may be subject to disciplinary action, up to and including termination. The applicable Manager / Supervisor will review all incidents involving AECOM-owned, rented, or leased vehicles.

4.13.2 Citations and violations which occur while driving for AECOM business are to be reported as a vehicle incident in accordance with *S3AM-004-PR1 Incident Reporting, Notification & Investigation* within 24-hours. Incidents will be investigated as appropriate.

4.13.3 The AECOM Manager responsible for the employee, in consultation with the appropriate AECOM Human Resources representative, may suspend the privilege to operate vehicles on AECOM business due to noncompliance with the AECOM Vehicle and Driver Safety Program, involvement

in a motor vehicle incident, or resulting citations or other legal actions associated with motor vehicle violations.

4.13.4 The employee's driving privileges will be suspended for any of the following:

- Accidents or legal action involving alcohol or drug use (e.g., driving under the influence).
- Driving without a license.
- Hit-and-run driving or leaving the scene of an accident.
- Unauthorized use of AECOM vehicles (e.g., using an AECOM vehicle for moving personal items, carrying passengers who are not associated with work activities, etc.).

4.13.5 The employee's driving privileges may be suspended for any of the following:

- Two or more at-fault accidents involving the same Authorized Driver within a 12-month period.
- Multiple complaints from other employees or members of the public about driving performance.
- Any accident caused by an AECOM Authorized Driver where damages exceed $2,500.
- Failure to comply with the distracted driving requirements.
- Gross misconduct or violation of policy.

4.13.6 An Authorized Driver's driving privileges may be reinstated as follows:

- For any suspension resulting from law enforcement agency legal action involving drugs and alcohol on the part of the former Authorized Driver, driving privileges may be reinstated only by concurrent agreement of the Vice President of SH&E for the applicable Business Group and Human Resources Manager.
- For those Authorized Driver's privilege suspensions that are not related to driving under the influence of drugs or alcohol, privileges may be reinstated with concurrent agreement by the AECOM Manager, the SH&E Manager, and Human Resources Manager upon completion of required remedial training.

4.13.7 Disciplinary action may include the following:

- Loss of AECOM driving privileges.
- Disciplinary warning.
- Termination.

4.13.8 The employee is personally responsible for payment of fines for moving violations and parking citations incurred while driving a vehicle on AECOM business and for reporting such incidents to his/her Manager / Supervisor. The Manager is responsible for notifying Counsel.

4.13.9 If an Authorized Driver receives a citation resulting in the license being suspended from driving or has his/her driver's license revoked, he/she is required to notify his/her Manager / Supervisor prior to start of the following work day. Failure to do so may result in disciplinary action up to and including termination.

5.0 Records

5.1 Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

5.2 As applicable, completed *S3AM-005-FM2 Vehicle Inspection Checklists* and/or *S3AM-005-FM1 Journey Management Plans* shall be retained in project files.

6.0 Attachments

6.1 S3AM-005-ATT1 Authorized Driver Safety

6.2 S3AM-005-FM1 Journey Management Plan

6.3 S3AM-005-FM2 Vehicle Inspection Checklist

Americas

Housekeeping

S3AM-013-PR1

1.0 Purpose and Scope

1.1 This procedure provides AECOM's basic housekeeping requirements for offices and work sites, as well as establishes personal hygiene and sanitation standards for housekeeping.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-208-PR1 Personal Protective Equipment

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Implementation of this procedure at all AECOM sites and offices.
- Confirm inspections are performed at appropriate intervals.
- Confirm the building Property Manager maintains leased facilities effectively.

4.1.2 **SH&E Managers**

- Monitor, assess, and report on housekeeping when visiting AECOM sites.

4.1.3 **Employees**

- Report any areas of concern to their Manager / Supervisor for prompt resolution.
- Maintain office locations that are free from debris, clutter, and slipping or tripping hazards.

4.2 General Housekeeping

4.2.1 All aisles, emergency exits, fire extinguishers, etc., will be kept clear (a minimum of three feet / 0.9 meters of either side) of material storage (temporary and permanent) at all times.

4.2.2 Areas in front of electrical panels will be kept clear and free of debris and materials storage for a minimum distance of 36 inches, or approximately 0.9 meters.

4.2.3 All work areas shall be kept clean to the extent that the nature of the work allows.

4.2.4 Spills shall be promptly cleaned up and resulting waste will be disposed of properly.

4.2.5 Storage areas will be maintained in an orderly manner at all times. When supplies are received, the supplies will be stored properly.

4.2.6 At all times, work areas will be kept free of debris and unused materials, tools and equipment that may affect the safety of employees and visitors.

4.2.7 All sharps, and sharp objects, shall be stored and/or guarded in a manner that prevents injury.

4.2.8 Recyclable material, debris and trash will be collected and stored in appropriate containers (e.g., recycle bins, plastic trash bags, garbage cans, roll-off bins) prior to disposal or recycling.

4.2.9 Containers maintained outdoors shall be provided with lids that are kept closed. Contents shall be removed at appropriate intervals (e.g. garbage weekly, garbage daily in areas with wildlife, monthly recyclable cardboard, etc.).

4.2.10 Take positive control measures for protection against vermin, insects, and rodents.

4.3 Smoking, Eating, and Drinking

4.3.1 Eating and drinking will be permitted in designated areas. These areas shall be located away from the work zone.

4.3.2 Operate and maintain food dispensing facilities established by AECOM in compliance with applicable health and sanitation regulations.

4.3.3 Buildings housing food dispensing facilities shall be floored completely, painted, well lighted, heated, ventilated, fly proof, and sanitary. Equip doors and windows with screens.

4.3.4 Microwave ovens shall be used for food only.

4.3.5 Use refrigerators designated for food storage for food only (i.e., no chemical or samples storage).

4.3.6 Hand washing stations shall be available nearby for employees entering the eating and smoking areas.

4.3.7 Smoking will be permitted only in areas:

- Designated in compliance with applicable local laws, regulations, legislation and ordinances;
- Not in the immediate vicinity of work-related activities or designated eating and drinking areas.
- Free of fire hazard;
- That will not contaminate indoor areas and HVAC systems. Specifically, there shall be no smoking within 5 metres (16 feet) around doorways, windows, air vents, and HVAC intakes and equipment; and
- Supervisors will designate each smoking area giving primary consideration to those employees who do not smoke.

4.3.8 Employees involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER-controlled work areas).

4.3.9 Site employees will first wash hands and face after completing work activities which involve potential exposure or contact with hazardous substances and prior to eating or drinking.

4.4 Water Supply

4.4.1 Water will be available for use on all AECOM sites and will comply with the following requirements:

- Potable Water:
  - An adequate supply of drinking water will be available for site staff consumption.
  - Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains.
  - Water coolers and water dispensers shall be maintained in a sanitary condition and filled only with potable water.
  - Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Do not use common drinking cups.
  - Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
  - Laboratory-test drinking water obtained from streams, wells, or other temporary sources in accordance with applicable regulations, or often enough to ensure it is suitable for consumption. Maintain records of testing reports and results.

- Non-potable Water:
  - Non-potable water will not be used for drinking purposes.
  - Non-potable water may not be used for hand washing or other personal hygiene activities but may be used for other types of cleaning activities.
  - All containers/supplies of non-potable water used will be properly identified and labelled as such.

4.5 Toilet Facilities

4.5.1 Clean and sanitary toilet facilities in good repair will be available for site and office staff and visitors. For locations without flush toilets readily available, one of the following shall be provided:

- Chemical toilets.
- Combustion toilets.
- Recirculation toilets.

4.5.2 A minimum of one toilet will be provided for every 20 site staff, with separate toilets maintained for each sex, except where there are less than five total staff on site or in an office.

4.5.3 Where toilet facilities will not be used by women, urinals may be provided instead of water closets in accordance with jurisdictional regulations.

4.5.4 Provisions for toilet facilities shall be considered as being met when mobile crews or employees working at normally unattended work locations have transportation immediately available (within 4 minutes travel time) to nearby toilet facilities.

4.5.5 Toilets shall be constructed so that the interior is lighted, by artificial or natural light, adequate ventilation is provided, and all windows and vents are screened.

4.5.6 A means for washing hands shall be provided next to or near toilet areas.

4.5.7 Release sanitary sewage into sanitary sewer lines or to other proper disposal channels.

4.6 Washing Facilities

4.6.1 Hand and Face: As applicable to the individual's potential exposure or contact with hazardous substances, site staff will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

4.6.2 Personal Cleaning Supplies: Cleaning supplies at all AECOM sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

4.7 Work Areas

4.7.1 Worksites which store chemical or environmental samples in refrigerators will clearly label the refrigerators that no food or beverages permitted and will locate refrigerators and sample coolers used for temporary sample storage, away from any food areas.

4.7.2 Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footgear shall be provided.

4.7.3 Protruding objects or placement of materials on paths or foot traffic areas creates the risk of slips, trips, falls, and puncture wounds. Employees shall eliminate slip, trip, and fall hazards where reasonably practicable.

4.7.4 At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8 Break Areas and Lunchrooms

Site staff will observe the following requirements when using break areas and lunchrooms at AECOM sites:

4.8.1 All food and drink items will be properly stored when not in use.

4.8.2 Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.

4.8.3 Perishable foods will be refrigerated whenever possible.

4.8.4 All waste food containers will be discarded in trash receptacles.

4.8.5 All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.

4.8.6 All ice dispensing machines for beverages shall be hands free/touchless design to prevent bacterial contamination (no ice scoops or ice bins permitted, closed beverage containers can be stored in portable ice coolers but the ice may not be used in the beverage).

4.8.7 Refrigerators used to store food items will be maintained at 40 degrees Fahrenheit (4 degrees Celsius) and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labelled as such so that only food and drinks are stored within the refrigerator.

4.8.8 Routine cleaning of refrigerators will also be performed on a regular basis.

4.9 Change Rooms and Sleeping Facilities

4.9.1 Heated and ventilated change rooms shall be provided for changing, hanging, and/or drying clothing for operations subjecting employees to prolonged wetting or contact with hazardous materials.

4.9.2 Temporary sleeping quarters shall be heated, ventilated, lighted, and clean with all doors and windows screened.

4.9.3 Keep clean and sanitary, and periodically disinfect bunkhouses, bedding, and furniture.

4.10 Office Areas

Office areas are to be kept neat and orderly. The following general rules apply to prevent injuries and to maintain a professional workplace appearance.

4.10.1 All waste receptacles shall be lined with a plastic trash bag to avoid direct contact with waste during disposal. Employees shall use gloves when handling waste and may use a compaction bar to compress waste when necessary.

4.10.2 Keep file and desk drawers closed when not in use to avoid injuries. Open only one file drawer at a time to prevent tipping of file cabinets. Nothing should be stored on top of high filing cabinets without adequate support.

4.10.3 Telephone cords, electrical cords, wastebaskets, open file cabinets, and other ground-level hazards shall be managed in a manner that protects employees from tripping and obstruction hazards.

- Electrical cords and computer/phone cables will be bundled and stored.
- Cord covers should be used to protect temporary extension cords (used for presentations etc.) where they could be a tripping hazard.
- Small electrical appliances shall not be plugged into portable extension cords.
- Multiple appliances amperage should not exceed the circuit load limits.

4.10.4 Electrical appliances shall not be used in wet areas unless the circuit is equipped with ground fault circuit interrupters (GFCI).

4.10.5 File cabinets, desk drawers, safes, and other doors shall be fitted with handles or other hardware to protect employees from pinch points.

4.10.6 All materials shall be stored in a manner that prevents tipping of storage furniture (e.g. book shelves, file cabinets) and inadvertent falling of overhead material.

4.10.7 Do not stack excessive amounts of papers or other material on shelves to reduce possibility of shelf overload or falling items.

4.10.8 Workstations should be tidied, as a minimum, at the end of each day.

- Paperwork that is not currently needed should be filed appropriately
- Refrain from storing items on the floor as they may become falling or tripping hazards.

4.10.9 In public areas of the office:

- Maintain chairs in good repair.
- Keep rugs clean, in good repair, and free of tripping hazards.
- Clean up spills immediately.
- Pick up objects that may have been left on the floor by others.
- Report loose carpeting, damaged flooring, or other obstructions that are present in walkways.

4.10.10 Broken or damaged office furniture and equipment shall be removed from service. Office equipment shall be repaired and serviced by qualified personnel or contractors.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-013-FM1 Housekeeping Inspection

Americas

Newly Hired or Transferred Employees

S3AM-015-PR1

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide direction for the mentoring and oversight of newly hired or transferred employees. It is understood that proportionally more incidents/injuries occur among less experienced staff members. The goal is to prevent incidents involving these employees, and to confirm they have a good understanding of the AECOM Safety for Life Program and Behavior-Based Safety (BBS) expectations.

1.2 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Short Service Employee (SSE)** - SSEs are those who have been newly hired or transferred to a different position in the company (e.g., one with new and possibly unfamiliar hazards and safe operating procedures).

3.0 References

3.1 S3AM-007-PR1 Behavior Based Safety

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Confirm implementation of this program where applicable.
- Identify Short-Service Employees (SSEs) in their groups. If an employee is designated as an SSE, the manager shall assign mentor to that person.
- Work with the SSE's mentor to designate someone on the field team to provide additional supervision and guidance during the time they are considered an SSE.

4.1.2 **Mentors**

- Confirm SSEs understand what training is required, are familiar with AECOM SH&E program, and know how to access various resources.
- Be available to answer safety-related questions and concerns from the SSEs they are mentoring.
- Work with the managers to identify an experienced field team member to provide temporary mentorship, oversight and guidance to SSEs during field activities. NOTE: The mentor may fill this role when working on the same field project with the SSE.

4.1.3 **Employees**

- Comply with this procedure and complete any required training.
- As applicable, subcontractors will comply with this procedure and complete any required training.

4.2 SSE Designation

4.2.1 An employee may be designated as an SSE. The requirements of this procedure will be applicable to a designated SSE, based on the following SSE Status Schedule:

- 0- to 6-Month SSE Status – Field employees who are new to AECOM or who are new to their current job assignment (e.g., someone who has experience in groundwater monitoring who transfers to a unit that performs stack sampling).
- 0- to 3-Month SSE Status – Non-field employees who are new to AECOM. This requirement acknowledges that approximately one-third of AECOM incidents occur in an office, rather than a field environment.
- Former employees who return to AECOM within 12 months and are placed into the same job assignment may not be designated as SSEs.

4.2.2 Managers will notify the appropriate safety representative of employees who have been designated an SSE, along with the end date for the SSE status.

4.2.3 The status of employees who have been designated as a SSE shall be monitored by the SSE's manager. *S3AM-015-FM1 SSE Record for Field Staff* or *S3AM-015-FM2 SSE Record for Office Staff* to document progress of designated SSEs.

4.2.4 The SSE status will be removed based on the schedule contained in this procedure if the employee's mentor determines the SSE has worked safely, followed AECOM and client Safety requirements, and has not been involved in an incident involving an injury, property damage, or a significant business interruption. *S3AM-015-FM1 SSE Record for Field Staff* or *S3AM-015-FM2 SSE Record for Office Staff* shall be used to document the removal.

4.2.5 SSEs shall be easily identified in the field environment, such as through wearing a specific colored hardhat, a manufacturer-approved orange stripe applied to their hardhat, or be clearly identified by some other system. In the event a client has an existing SSE program, AECOM will defer to the identification system required by the client. When required by a client, AECOM will notify the client of a SSE working onsite.

4.2.6 It is preferred that staff monitoring an SSE in the field will be assigned no more than one SSE at a time, and that crew sizes of five employees or fewer should have no more than one SSE assigned to the team. SSEs working in the field should not be assigned to work alone.

4.2.7 Mentors shall confirm SSEs assigned to them know:

- How to access information on the AECOM SH&E Management System and the appropriate SH&E procedures for the work they will be assigned to do.
- Their roles and responsibilities with respect to safety.
- What training they are required to have (e.g., computer-based training, classroom sessions, outside courses) and how to register for this training.
- Who their AECOM SH&E resources are.
- How to report an incident, near miss, at-risk behavior, or unsafe condition.
- AECOM's Life Preserving Principles
- The basic principles of the AECOM Behavior-Based Safety Program.
- How to prepare a basic task hazard assessment (THA).

4.3 Exemption or variance

4.3.1 In general, the SSE status schedule of this procedure should be followed.

4.3.2 Specific circumstances may warrant the extension of the SSE designation, reduction of the required time identified in the schedule, or an exemption.

4.3.3 Extension to the schedule may be necessary if it is determined the employee does not meet the requirements identified in the applicable *Record for Field Staff*, or *S3AM-015-FM2 SSE Record for Office Staff.* The extension shall be recorded on the same report.

4.3.4 Based on experience, knowledge of the AECOM SH&E program, and the tasks to be performed, the manager may recommend a reduction from the SSE time period specified in this procedure, or a full exemption form the time period. *S3AM-015-FM1 SSE Record for Field Staff*, or *S3AM-015-FM2 SSE Record for Office Staff* should be used to document the exemption or variance, and approval of the applicable SH&E Manager obtained.

4.3.5 Managers should notify the safety representative of any approved variances or exemptions from the SSE schedule.

4.3.6 Due to the wide variety of AECOM operations, a competency-based alternative system for SSE may be used. A competency-based system requires adequate training and safety skill demonstration for the specific tasks an individual is deemed competent to perform. An example of a competency-based system would be the project hiring of an experienced and well-trained heavy equipment operator. Competency-based systems shall be approved by the applicable SH&E Manager.

5.0 Records

5.1 The following documentation will be maintained in the employee's file:

5.1.1 *S3AM-015-FM1 SSE Record for Field Staff* or *S3AM-015-FM2 SSE Record for Office Staff*.

6.0 Attachments

6.1 S3AM-015-FM1 SSE Record for Field Staff

6.2 S3AM-015-FM2 SSE Record for Office Staff

Americas

Heat Stress

S3AM-113-PR1

1.0 Purpose and Scope

1.1 Establishes a Heat Illness Prevention Program to guide employees in preventing heat illness, recognition of the symptoms of heat stress-related illnesses and in taking the appropriate corrective action.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Acclimated –** Employees who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.

2.2 **Chemical Protective Clothing (CPC)** – Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the Employee with potentially hazardous materials in the workplace. Such materials include Tyvek® coveralls (all types) and polyvinyl chloride coveralls and rain suits.

2.3 **Heat Cramps** – A form of heat stress brought on by profuse sweating and the resultant loss of salt from the body.

2.4 **Heat Exhaustion** – A form of heat stress brought about by the pooling of blood in the vessels of the skin and in the extremities.

2.5 **Heat Rash** – A heat-induced condition characterized by a red, bumpy rash with severe itching.

2.6 **Heat Stress** – The combination of environmental and physical work factors that constitute the total heat load imposed on the body.

2.7 **Heat Stroke** – The most serious form of heat stress, which involves a profound disturbance of the body's heat-regulating mechanism.

2.8 **Sunburn** – Caused by unprotected exposure to ultraviolet radiation present in sunlight that is damaging to the skin (Refer to *S3AM-121-PR1 Non-Ionizing Radiation*). The injury is characterized by red painful skin, blisters, and/or peeling.

2.9 **Unacclimated** – Employees who have not been exposed to hot work conditions for one week or more or who have become heat-intolerant due to illness or other reasons.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3AM-010-PR1 Emergency Response Planning

3.4 S3AM-121-PR1 Non-Ionizing Radiation

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 Managers

- Evaluate the need for heat illness prevention measures and incorporate as appropriate into the Safe Work Plan or Task Hazard Analysis.
- Allocate sufficient resources for the management of heat illness in the field including the provision of water, a shaded break area, and sufficient schedule to allow for breaks.

4.1.2 Safety, Health and Environment (SH&E) Manager

- Provide heat illness awareness training.
- Assist in developing appropriate work-rest schedules.
- Conduct/support incident investigations related to potential heat stress-related illnesses.

4.1.3 Supervisor

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned Employees.
- Confirm that Employees have been trained on the recognition of heat illness.
- Confirm that this procedure, along with any applicable Safe Work Plan and/or Task Hazard Analysis (and heat exposure control plan that may be contained therein) are made available to affected Employees.
- Confirm that adequate supplies of appropriate fluids are readily available to Employees.
- Confirm that a proper rest area is available.
- Conduct heat illness monitoring, as applicable.
- Implement the work-rest schedule.
- Confirm that first aid measures are implemented once heat stress symptoms are identified.
- Confirm personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- Report all suspected heat illnesses.

4.1.4 Employee

- Observe each other for the early symptoms of heat illnesses.
- Maintain an adequate intake of available fluids.
- Be familiar with heat stress hazards, predisposing factors, and preventative measures.
- Report to work in a properly vested and hydrated condition.
- Report all suspected heat stress-related illnesses.

4.2 Restrictions

4.2.1 The Buddy System is required when working in high heat conditions; Employees shall not work alone.

4.2.2 Employees shall not be exposed to levels exceeding those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.2.3 Clothing corrections shall be applied in accordance with the tables provided in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.3 Exposure Controls

4.3.1 It shall be determined whether Employees are or may be exposed to hazardous heat levels. The Supervisor shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of Employees. Assessment shall include, but not limited to:
  - Ambient temperature.
  - Amount of sunshine (cloudy, clear). Refer to *S3AM-121-PR1 Non-Ionizing Radiation* additional direction concerning ultraviolet radiation exposures.
  - Other radiant heat sources (e.g. motor, fire, etc.).
  - Humidity.
  - Air flow.
  - Amount or type of physical labor being performed,
  - Physical condition of the Employees (e.g., acclimated/not)
  - Protective clothing in use.
  - Referral to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* to assist in determining whether hazardous heat exposures may exist.
- If potential for hazardous exposure is identified, the Supervisor shall develop and implement a heat stress exposure control plan within the Safe Work Plan and/or Task Hazard Analysis. Refer to *S3AM-209-PR1 Risk Assessment & Management.*

4.3.2 If Employees are or may be exposed, the Supervisor shall implement engineering controls (e.g., shelters, cooling devises, etc.) to reduce the exposure of Employees to levels below those specified for the given work level and work-rest regimen as listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*.

4.3.3 If engineering controls are not practicable, the Supervisor shall reduce the exposure of Employees to levels below those listed in *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* by providing administrative controls, including a work-rest cycle or personal protective equipment, if the equipment provides protection equally effective as administrative controls.

4.3.4 If Employees are or may be exposed, the Supervisor shall provide and maintain an adequate supply of cool, fresh, potable water close to the work area for the use of a heat exposed Employee. Water shall be provided (paid) by the project or program; if Employees purchase their own drinking water because water is not otherwise available on site, they shall be reimbursed.

4.3.5 If an Employee shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant on site, if available, or by a physician, refer to *S3AM-113-ATT2 Heat Stress – Symptoms & Treatment* for more specifics.

4.4 Heat Stress Planning

4.4.1 Heat stress can be a significant site hazard, especially for Employees wearing CPC. To prepare for emergency response planning, refer to *S3AM-010-PR1 Emergency Response Planning* procedure.

4.4.2 The project and site-specific heat related risks shall be identified. Appropriate prevention and control measures shall be developed and documented in the project's SH&E Plan or included as a supplement to the SH&E Plan (e.g., *S4[DCS]AM-113-FM1 Heat Illness Prevention Plan – DCS Americas*) and the Task Hazard Assessments (THA). Refer to the *S3AM-209-PR1 Risk Assessment & Management* procedure.

4.4.3 The heat a worker is exposed to may be a combination of air temperature, radiant heat, and humidity. The WBGT (wet-bulb globe thermometer) is a useful index of the environmental

contribution to heat stress. Because WBGT is only an index of the environment, the contributions of work demands, clothing, and state of acclimatization shall also be accounted for, as described in the following steps.

- Monitor ambient temperatures and conduct heat stress monitoring in accordance with the location specific SH&E Plan. Revise the heat stress monitoring and controls if there are any reports of discomfort due to heat stress.
- Monitor temperatures in each unique environment in which workers perform work (e.g., take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in the outdoor area where field employees work, etc.). Follow manufacturer's instructions on proper use of the WBGT.
- Determine if individual workers are acclimatized or un-acclimatized. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, or when there is a sustained increase in temperatures of 10 °F (5.6 °C) or more, and a noticeable loss occurs after 4 days. A worker can be considered acclimatized for the purpose of this procedure when they have been exposed to the site conditions (including level of activity) for 5 of the last 7 days.
- Determine the approximate workload of each worker or group of workers. The following examples (Table 1) can be used for comparison:

Table 1
Examples of Activities within Workload Categories

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on level at 3.5 miles/hr (6 km/hr) while carrying 6.6 lbs (3kg) weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a non-continuous basis
	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
Very Heavy	Shoveling wet sand

- Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.
- For workers wearing cloth coveralls (e.g., Nomex fire resistant clothing), add 3 to the measured WBGT. For impermeable clothing, such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70ºF (21°C).
- Use the collected information to develop appropriate work to rest schedules as detailed in *S3AM-113-ATT1 Heat Stress – Temperature Threshold*. Work-rest schedules and water provision shall be documented in the applicable SH&E Plan or supplementary Health Illness Prevention Plan and may be additionally documented using logs such *as S3AM-113-FM2 Daily Heat Illness Prevention Log*.

4.4.4 Given the work demands (light, moderate, heavy or very heavy), heat of the work environment, and such aspects as PPE in use, workload will be adjusted appropriately to allow for proper acclimation.

- This is the process by which the body "gets used to" hot work environments. This is achieved by slowly increasing workloads.
- New and returning Employees (absent one week or more) who have not had time to acclimatize may be more susceptible to heat related illnesses, even in seemingly low risk heat exposures.
- All Employees shall be allowed time to acclimatize in the event of a heat wave. All Employees assigned to a new process with additional heat exposures shall be allowed to acclimatize.
- Minimize workload and gradually increase as tolerance is built up. Allow for more frequent breaks.
- While acclimatization normally takes approximately 5 to 7 days, heightened monitoring of these Employees will be maintained for the first 14 days.

4.4.5 Employees shall be instructed in the recognition of heat stress symptoms, the first aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Employees shall be encouraged to immediately report any heat stress that they may experience or observe in fellow Employees. Supervisors shall use such information to adjust the work-rest schedule to accommodate such problems.

4.4.6 Wherever possible, a designated break area should be established in an air-conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow Employees to loosen or remove protective clothing, and sufficient seating should be available for all Employees. During breaks, Employees shall be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

4.5 Symptoms and Treatment

4.5.1 Refer to *S3AM-113-ATT2 Heat Stress – Symptoms & Treatment*.

4.5.2 Employees who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin) shall be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water.

4.5.3 Severe heat stress (heat stroke) is a life-threatening condition requiring immediate emergency medical care (e.g., call 911). Anyone exhibiting symptoms of heat stroke (slurred speech, unconsciousness, etc.) shall be taken immediately to the nearest medical facility. Steps shall be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.6 Prevention

4.6.1 Requirements for working in extreme heat may be triggered by regulatory established criteria (e.g. CAL/OSHA requires high heat procedures when temperature equals or exceeds 95°F) or as a result of a hazard analysis assessing various contributory factors (refer to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds*). Employees working in extreme heat or sun should understand and apply the following guidelines for preventing and detecting heat exhaustion and heat stroke.

- When possible, begin hydrating at least three days prior to working in high heat conditions.
- Review the heat stress exposure control plan within the SH&E Plan, and/or Task Hazard Analysis.
- If the supervisor is not immediately available confirm a reliable method of communication is in place to allow for contact with supervision. In the absence of cellular reception, a satellite phone or similar device may be required.

- Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
- Try to schedule work for the coolest part of the day, early morning and evening.
- Avoid strenuous physical activity outdoors during the hottest part of the day.
- Avoid sudden changes of temperature. Refer *to S3AM-113-ATT1 Heat Stress – Temperature Threshold*s.
- Air out a hot vehicle before getting into it.
- Obtain medical direction if taking diuretics during hot weather (a lower dose may be necessary).
- When working in heat, drink 1 quart of water per hour of work.
- Avoid caffeine and alcohol as they increase dehydration.
- Monitor urine frequency and color to detect dehydration. Refer to the *S3AM-113-ATT3 Dehydration Chart.*
- The Buddy System is required when working in high heat conditions to enable effective communication and cross-observation for indications of heat stress.
- Initiate emergency response procedures when necessary, including contacting emergency medical services as appropriate and in accordance with the Emergency Response Plan.

4.6.2 Personal Protective Equipment

- Review the *S3AM-208-PR1 Personal Protective Equipment* procedure.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Apply sunscreen to exposed skin (SPF 30 or greater, follow directions on label).
- Wear sunglasses with UV protection.
- Pack extra water to avoid dehydration (try freezing water in bottles overnight to help keep the water cooler for longer during the day).

4.7 Work-Rest Schedule Practices

4.7.1 Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.

- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 ounces (1 quart) per hour during the work shift; fluid replacement at frequent intervals is most effective.
- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.

4.7.2 Additional salt is usually not needed and salt tablets should not be taken.

4.7.3 Fluids for drinking should be cool and fresh, but not cold.

4.7.4 Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.

- A relatively cool, shaded area shall be provided for breaks when working in hot environments. For hazardous waste sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decontamination area so workers can take breaks without going through full decontamination.

- If shade is not available, shaded areas shall be constructed. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.
- Cooling measures other than shade (e.g., misting, air-conditioned break areas, air conditioned vehicles, etc.) can be used in lieu of shade provided it can be demonstrated that they are at least as effective in cooling employees.
- Employees should have access to these rest areas at break times and at any other time when suffering from heat illness or believing a preventive recovery period is needed.

4.7.5 Dry clothing or towels should be available to minimize chills when taking breaks.

4.7.6 Manual labor will not be performed during breaks, other than paperwork or similar light tasks.

4.7.7 Other controls that may be used include:

- Scheduling work at night or during the cooler parts of the day (6 am–10 am, 3 pm–7 pm).
- Erecting a cover or partition to shade the work area.
- Auxiliary cooling - wearing cooling devices beneath protective garments, but over any underclothing.
    - If cooling devices are worn, only physiological monitoring will be used to determine work activity.
    - These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.
    - The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.
    - The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.
- Auxiliary cooling should be considered when the following conditions exist:
    - Ambient temperature over 80°F (26°C).
    - Workers are wearing impermeable garments (i.e., Tyvek, Saranex, Chemrel, etc.).
    - It is desirable to have long work shifts with minimum interruption.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

4.8.1 Once a work-rest schedule is established, the Supervisor shall continually evaluate its effectiveness through observation of Employees for signs/symptoms of heat stress. Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.

4.8.2 Measurement or physiological monitoring of each Employee's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate. Refer to *S3AM-113-ATT1 Heat Stress – Temperature Thresholds* for additional guidance on when physiological monitoring should be conducted.

4.8.3 Frequency of physiological monitoring is increased or decreased depending upon such factors as worker fitness, acclimatization, temperature of the work environment, type of PPE, etc.

Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:

- The work period may be increased (generally, by 5- to 10-minutes intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers are recovering adequately (see below), and on the judgment of the SH&E Manager.
- The work period shall be decreased if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).

4.8.4 If physiological monitoring is conducted, the Employee and/or the SH&E Manager (or appropriate designate) shall measure and record body temperature and pulse rate as described below.

4.8.5 Monitor body temperature to determine if Employees are adequately dissipating heat build-up. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:

- Measure oral body temperature at the end of the work period. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.
- If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
- If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.
- Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).

4.8.6 At the start of the workday each Employee's baseline pulse rate (in beats per minute [bpm]) is determined by taking a pulse count for 15 seconds and multiplying the result by four or by using an automated pulse count device. Pulse rates can then be measured at the beginning of each break period and two minutes thereafter to determine if the rest period allows for adequate recovery.

- Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.
- Wait 2 minutes and repeat the pulse measurement. Record this as P2.
- If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 – P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.
- At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 – P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.
- At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 – P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 – P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

4.8.7 Use of an automated or similar blood pressure device will be used to assess each Employee's blood pressure at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- If the blood pressure of an Employee is outside of 90/60 to 150/90, then the Employee will not be allowed to begin or resume work; extend the break period by at least five minutes, at the end of which blood pressure rates will be re-measured and the end-of-break criteria again applied.

4.8.8 All physiological monitoring of heat stress will be documented using *S3AM-113-FM1 Heat Stress Monitoring Log.*

4.9 Training

4.9.1 Employees and their Supervisors that may be exposed to the hazard will be trained and oriented to the hazard and the controls prior to work commencing.

4.9.2 Those Employees, including Supervisors, potentially exposed to heat stress will receive training, refer to the *S3AM-003-PR1 SH&E Training* procedure. Training will include, but is not limited to:

- Sources of heat stress (environmental and personal), influence of protective clothing, and importance of acclimatization;
- How the body handles heat and acclimatization;
- Recognition of heat-related illness symptoms;
- Preventative/corrective measures including, but not limited to;
  - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
  - All Employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
- First aid procedures for heat stress-related illnesses; and
- Immediate reporting of any heat-related incident (injury, illness, near-miss), refer to the *S3AM-004-PR1 Incident Reporting, Notifications & Investigation* procedure.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-113-ATT1 Heat Stress - Temperature Thresholds

6.2 S3AM-113-ATT2 Heat Stress - Symptoms & Treatment

6.3 S3AM-113-ATT3 Dehydration Chart

6.4 S3AM-113-FM1 Heat Stress Monitoring Log

6.5 S3AM-113-FM2 Daily Heat Illness Prevention Log

6.6 S3[DCS]AM-113-FM1 Heat Illness Prevention Plan – DCS Americas

Americas

Non-Ionizing Radiation

S3AM-121-PR1

1.0 Purpose and Scope

1.1 Provides the requirements and guidelines to control occupational and public exposure to non-ionizing radiation, including lasers and radiofrequency (RF), infrared (IR), and ultraviolet (UV) radiation.

1.2 This procedure applies to all AECOM Americas employees and operations, and any other entity and its personnel contractually required to comply with this document's content, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

2.1 **Controlled Environment** – An area where the occupancy and activity of those within is subject to control and supervision for the purpose of protection from radiation hazards.

2.2 **Hazard Distance** – Distance from a radiofrequency emitter at which the power density equals the Uncontrolled Environment Maximum Permissible Exposure Limit power density level as established by the latest edition of the ANSI C95.1.

2.3 **ANSI Z136.1 Safe Use of Lasers**– American National standard issued applicable to the safe use of lasers and laser systems emitting laser radiation in the wavelength range 180 nanometres to 1 millimetre. The standard defines the classification of lasers (Class 1, 1M, 2, 2M, 3R, 3B and 4) based on Accessible Emission Limit (AEL) and viewing conditions.

2.4 **Infrared (IR)** – Electromagnetic radiation having a wavelength just greater than that of the red end of the visible light spectrum but less than that of microwaves. Infrared radiation has a wavelength from about 800 nm to 1 mm, and is emitted particularly by heated objects

2.5 **Laser –** An acronym for Light Amplification by Stimulated Emission of Radiation.

2.6 **Maximum Permissible Exposure (MPE) Limits** – The level of exposure which is considered as the limit between safe and potentially harmful.

2.7 **Non-ionizing Radiation** – Any type of electromagnetic radiation that does not carry enough energy to ionize atoms or molecules. Examples include radiofrequency radiation, microwave radiation, ultraviolet radiation, visible light, infrared radiation, lasers, static electric and magnetic fields, etc.

2.8 **Radio frequency (RF)** – Any of the electromagnetic wave frequencies that lie in the range extending from around 3 kHz to 300 GHz, and includes frequencies used for communication signals (e.g. radio, cell-phone, etc.) or radar signals.

2.9 **Ultraviolet (UV)** – Electromagnetic radiation having wavelengths between that of ordinary, visible violet light that of x-rays. Ultraviolet radiation is made up of three types of rays; A (UVA), B (UVB), and C (UVC). UV radiation is present in sunlight, and also produced by electric arcs and specialized lights (e.g. mercury-vapor lamps, black lights).

2.10 **Uncontrolled Environment** – Locations where there is the exposure of individuals who have no knowledge or control of their exposure.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-120-PR1 Radiation

3.3 S3AM-128-PR1 Medical Screening & Surveillance

3.4 S3AM-208-PR1 Personal Protective Equipment

3.5 S3AM-209-PR1 Risk Assessment & Management

3.6 S3AM-325-PR1 Lockout Tagout

3.7 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Corporate SH&E Management System & Prequalification Manager**

The SH&E Department will maintain this procedure and include it in the annual review of the AECOM Americas SH&E procedures.

4.1.2 **SH&E Manager (or designee)**

The SH&E Manager will provide technical guidance to projects that involve the use/survey of non-ionizing sources as well as identifying the proper controls to mitigate employee exposure to non-ionizing radiation sources, including UV radiation. In addition, SH&E Managers will:

- Review and approve all exposure plans, such as Non-Ionizing Radiation Protection Plans (NIRPP);
- Conduct non-ionizing radiation hazard assessments;
- Confirm applicable awareness training on non-ionizing radiation hazards is available to project teams. Refer to *S3AM-003-PR1 SH&E Training*;
- Authorize the use of a Class 3B and 4 lasers.

4.1.3 **Manager**

Managers are responsible for the overall safety and planning for a project. Managers are also responsible for:

- Verifying that the presence of non-ionizing radiation sources at project work sites are identified in the applicable SH&E Plan and Task Hazard Assessment (THA) prior to commencing field activities;
- Addressing and controlling potential non-ionizing radiation hazards through consultation with the SH&E Manager, subject matter experts (as appropriate), and/or development of a NIRPP;
- Verifying incident and injury reporting procedures are followed when a suspected overexposure to non-ionizing radiation, an incident of sunburn, or other excessive non-ionizing radiation exposure occurs in the workplace;
- Monitoring employee compliance with the requirements of this policy;
- Confirming employees complete non-ionizing radiation awareness training as directed by the SH&E Manager.

4.1.4 **Employee**

- Will not disturb or handle any non-ionizing radiation sources or work in any identified non-ionizing radiation hazard area (e.g.., Controlled Environment) without appropriate training and safety procedures;
- Will work in accordance with all established manufacturer, client, and NIRPP requirements;
- Will identify both known and suspected non-ionizing radiation sources on the THA and report any change in site conditions related to non-ionizing radiation sources to the Manager;
- Will immediately notify the Manager of the presence or suspected presence of previously unidentified non-ionizing radiation sources in the workplace, and cease all work activities involving potential exposure to non-ionizing radiation until further direction is received;
- Will use suitable personal protective equipment to the non-ionizing radiation hazards.

4.2 Hazard Assessment

4.2.1 AECOM will identify and assess the hazards associated with work where the potential exists for employees to be exposed to laser radiation or other non-ionizing radiation sources, develop appropriate elimination and control measures, and document this in the location or project specific SH&E Plan.

- If routine exposures to laser radiation or other non-ionizing radiation sources are expected, an appropriate plan, such as a Non-Ionizing Radiation Protection Plan (NIRPP) should be developed. The plan (e.g. NIRPP) may be included in the location or project specific SH&E Plan;
- Consultation with subject matter experts may be necessary depending upon the extent, number, and type of non-ionizing radiation (e.g., Laser Safety Officer);
- Task specific hazards and associated controls shall also be identified in the respective THA;
- Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.2 In addition to the SH&E Plan, appropriate personal protective equipment will be identified and documented in the THA or other relevant hazard assessment documentation.

4.2.3 AECOM will develop and implement an appropriate NIRPP to control identified hazards where the potential to exceed the applicable Maximum Permissible Exposure (MPE) limits exist.

4.3 Laser Protection Requirements

4.3.1 Only qualified and trained employees will be assigned to install, adjust, and operate laser equipment for surveys, alignment/grade-checks, tunnel work, etc.

4.3.2 Laser equipment will bear a label to indicate maximum power output, ANSI class, and beam spread.

4.3.3 Looking into the primary beam is prohibited, and care will be taken to avoid looking at specular reflections of the beam, including those from lens surface work.

4.3.4 Where direct or reflected laser light greater than 0.005 watts (5 milliwatts) for ≥ ¼ second exists, employees will be provided with laser safety goggles that will protect them for the specific wavelength of the laser and be of an optical density (OD) adequate for the energy involved. The laser safety goggles will be selected in accordance with the requirements of ANSI Z136.1-2014 (or the most current edition).

4.3.5 Operation of an ANSI Class 3B or 4 laser should be assessed for exposure hazards and whether medical surveillance is appropriate. Refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3.6 Use of an ANSI Class 4 laser requires the approval of the SH&E Manager.

4.3.7 All protective goggles will bear a label identifying the following data:

- The laser wavelength for which use is intended;
- The optical density of that wavelength;
- The visible light transmission.

4.3.8 Class 1 Lasers

- Safe for the unprotected eye and through optical instruments (prescription lenses, telescopes, beam reducers, etc.);
- Very low power lasers or enclosed lasers;
- MPE is never exceeded, even for very long exposure (hours), or with the use of optical instruments;
- Nominal Hazard Zone: none.

4.3.9 Class 1M Lasers

- Safe for the unprotected eye only, but potentially hazardous when optical instruments are used;
- Medium power lasers either collimated with a large beam or highly divergent;
- MPE can be exceeded when using optical instruments;
- Nominal Hazard Zone: none for the unprotected eye.

4.3.10 Class 2 Lasers

- Safe for unintended exposure, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds;
- Visible (wavelength of 400–700 nanometers) low power lasers;
- MPE is not exceeded provided the viewings are accidental only. MPE calculation assumes the blink reflex will stop the light after 0.25 second;
- Nominal Hazard Zone: none for accidental exposure.

4.3.11 Class 2M Lasers

- Safe for the unprotected eye when the exposure is unintended, (less than 0.25 seconds) but hazardous when looking at for more than 0.25 seconds or when optical instruments are used;
- Visible (wavelength of 400–700 nanometers) medium power lasers either collimated with a large beam or highly divergent;
- MPE is not exceeded provided the viewings are accidental only and only with unprotected eyes. MPE calculation assumes the blink reflex will stop the light after 0.25 seconds. Using optical instruments might bring the exposure above the MPE as well;
- Nominal Hazard Zone: none for accidental exposure to the unprotected eye.

4.3.12 Class 2M Lasers and Greater

- Areas where a Class 2M or higher, non-enclosed path laser beam is in use will be posted with standard laser-warning placards;
- Beam shutters or caps will be used, or the laser turned off, when laser transmission is not actually required. When the laser is left unattended for a period of time (e.g., >5 minutes), such as during the lunch hour, overnight, or at change of shifts, the laser will be turned off;
- Only mechanical or electronic means will be used as a detector for guiding the internal alignment of the laser. Aligning the laser with the unprotected eye is prohibited;
- The laser beam will not be directed at employees. Laser units will be set above or below the heads of employees;
- Employee exposure will be controlled to stay within the MPE limits specified in ANSI Z136.1-2014 (or the most current edition).

4.3.13 Class 3R Lasers

- Unsafe, except when handled carefully by experienced users. Accidental short exposure is considered as a small hazard;
- Low power lasers;
- MPE can be exceeded up to 5 times;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.14 Class 3B Lasers

- Unsafe without exception, laser safety goggles shall be worn within the nominal hazard zone. Focused lasers of this class are a potential fire hazard;

- Medium power lasers;
- MPE is exceeded more than 5 times. Skin MPE is not generally exceeded, except at focus;
- Nominal Hazard Zone: hazard area for the eye, none for the skin.

4.3.15 Class 4 Lasers

- Dangerous, Personal Protective Equipment (PPE) for eyes and skin shall be worn within the nominal hazard zone. Class 4 lasers are fire hazards as well. Diffuse reflections may be hazardous;
- High power lasers;
- Ocular and skin MPE are exceeded. Diffuse reflections exceed the MPE;
- Nominal Hazard Zone: hazard area for the eye and for the skin.

4.4 Radiofrequency Radiation Protection

4.4.1 Reduction in radiofrequency (RF) exposures can be accomplished through the implementation of appropriate administrative, work practice and engineering controls. Should routine occupational RF exposures be part of a project, a suitable plan shall be developed such as an NIRPP.

4.4.2 Generally, where RF emitters are identified, employees will:

- Remain outside any demarcated area where an RF hazard exists;
- Remain within the General Public exposure region;
- If the preceding requirements cannot be met or determined, AECOM will obtain a hazard assessment from the emitter's operator for controlling entity and provide it to the SH&E Manager for evaluation and determination of the relevant hazard mitigation measures.

4.4.3 If the above information is not available, an RF emitter survey will be required to assess the potential exposure hazards. An RF emitter survey shall be performed by an individual trained to effectively assess RF exposures.

4.4.4 Unless using an RF meter under the direction of an individual trained to effectively assess RF exposures, employees will not enter any area which is located within the RF hazard distance identified by the RF emitter survey. AECOM personal may enter a controlled area if the emitter has been de-energized and locked-out using standard Lockout/Tagout procedures in accordance with *S3AM-325-PR1 Lockout Tagout.*

4.5 Infrared Radiation Protection

4.5.1 Infrared (IR) radiation may be encountered during furnace operations, pouring, casting, hot dipping, laser and high-intensity light sources, curing, annealing and plastic welding.

4.5.2 Performance of welding and oxygen/acetylene cutting operations (torch cutting, brazing, welding) involves the use of an exposed high-temperature flame. This flame produces infrared (IR) radiation and UV radiation at the welding location which can cause cataracts, skin cancer, and thermal burns to the welder or other persons located nearby.

4.5.3 Skin Protection

- Long sleeve, flame-resistant shirts and/or forearm length Nomex gloves will be worn;
- Leather welder's apron or equivalent protection;
- Long pants shall be worn during any hot work task;
- Welding screens shall be utilized where feasible to protect the general public or other unprotected employees.

4.5.4 Eye Protection

- A welder's helmet or goggles with the appropriate lens shade will be worn. Refer to

S3AM-208-PR1 Personal Protective Equipment.

4.6 Ultraviolet Radiation Protection

4.6.1 Broad-spectrum UV radiation is classified as a known human carcinogen. UV radiation can cause harmful effects from both chronic and acute exposures including reddening of the skin (regardless of skin tone), accelerated skin aging, and damage to the eyes (e.g., cataracts, retinal burns, or welder's flash), and sunburn. Employees may be exposed to UV radiation from natural sunlight or manmade sources such as germicidal lamps (e.g., UV groundwater treatment systems) and welding.

4.6.2 While not required, the completion of an exposure or UV risk assessment will assess the risk posed by UV at the site. Such an assessment can be included in the SH&E plan and as part of a Task Hazard Assessment (THA). Special consideration should be given to work activities at higher elevations as the intensity of UV exposures are significantly higher than at lower elevations. Typically, UV exposure can increase 4-5% for every 1000 feet ascended. Also, some medications (e.g., Tetracycline) can increase sensitivity to UV exposure.

4.6.3 Control measures will be implemented at a worksite according to the conditions and work performed.

4.6.4 Engineering Controls

- Operations producing IR or UV radiation may be segregated or separated from other operations (e.g. use of automated systems, walls, screens, etc.);
- Employees will be encouraged to maximize use of the shade provided by trees, buildings, and other structures;
- Where there is limited access to natural shade, fixed or portable shade structures will be provided where practical;
- It is acknowledged that the provision of shade does not provide total protection from UV; therefore, it is recommended that outdoor workers adopt personal protection strategies such as protective clothing, sunscreen, and the wearing of hats in addition to using shade.

4.6.5 Administrative Controls

Consideration will be given to the reorganization of outdoor work programs to reduce UV exposure including, but not limited to:

- Use of the UV Index to assess UV hazards;
- Rescheduling work hours to enable workers to start earlier during May-September;

The UV Index, shown in Table 1, can help employees be aware of the expected level of UV radiation exposure on any given day.

Table 1. UV Index

Exposure Category	Index Number	Sun Protection Messages
Low	< 2	Wear sunglasses on bright days. In winter, reflections off of snow can nearly double UV strength. If you burn easily, cover up and use sunscreen.
Moderate	3-5	Take precautions, such as covering up and using sunscreen.
High	6-7	Protection against sunburn is needed.
Very High	8-10	Take extra precautions. Unprotected skin will be damaged and can burn quickly.
Extreme	11+	Take all precautions. Unprotected skin can burn in minutes.

4.6.6 Personal Protective Equipment

Employees who work outdoors shall provide and utilize personal outer clothing (e.g. shirt and trousers) that meets the established general clothing requirements per *S3AM-208-PR1 Personal Protective Equipment*. For those circumstances where the outer clothing requirements exceed the general clothing requirements, AECOM will provide the necessary clothing. The selection of appropriate protective clothing will take into account both the need to block UV and the need to reduce the effects of heat.

- Protective Clothing
    - Full length trouser pants and shirts that cover shoulders at a minimum (where practical, the fabric will have a close weave);
    - Where possible, clothing will be lightweight, loose fitting and have a collar;
    - Clothing and head wear with a sun (UV) protection factor (SFP) is encouraged but not required.
- Secondary hazards such as fire resistance will be considered.
- Head, Face, and Neck Protection
    - Hats provide shade and the larger the brim the greater the amount of shade that is provided;
    - Full brim hard hats are recommended (for additional protection, neck flaps are recommended);
    - In circumstances where the wearing of a broad-brimmed hard hat causes difficulties due to its size, sunscreen and other protective measures will be used.
- Eye Protection
    - Wrap-around, close-fitting, large safety glasses will reduce the amount of UV and glare that may pass around the edges of the glasses (the color or darkness of the lenses does not indicate the level of UV protection; therefore, verification with the manufacturer should be performed);
    - Safety glasses shall provide the level of protection appropriate to the potential non-ionizing radiation hazard exposures;
    - For hot work activities that may produce ultraviolet radiation, eye protection shall utilize the proper welding shade.
- Sunscreen
    - Sunscreen does not offer complete protection against the sun and should always be used in conjunction with other protective measures;
    - A broad spectrum and water-resistant sunscreen with a SPF of 30+, or a rating of no less than three stars, will be provided;
    - Expiration dates on the sunscreen will be regularly checked to confirm it has not expired per the manufacturer's instructions;
    - Sunscreen should be placed in an easily accessible location and employees instructed on the correct application and use;
    - Sunscreen should be generously applied to all areas of exposed skin at least 20 minutes before going outside and reapplied every two hours, or as needed by the work conditions.

4.7 Non-ionizing Radiation Training Program

4.7.1 Employees will receive training where the need for non-ionizing radiation control measures has been identified in the SH&E Plan and if developed, the Non-Ionizing Radiation Protection Plan.

4.7.2 Awareness training on the applicable non-ionizing radiation source will be provided to employees prior to the start of work in the area where the hazard exists as well as when employees are required to enter non-ionizing radiation Controlled Environments. Training curricula will be determined by the SH&E Department.

5.0 Records

5.1 Training records shall be maintained in accordance with *S3AM-003-PR1 SH&E Training.* RF emitter surveys will be maintained in applicable project files.

6.0 Attachments

6.1 None

Americas

Hand & Power Tools

S3AM-305-PR1

1.0 Purpose and Scope

1.1 This procedure provides the AECOM requirements for all manually operated hand and power tools and associated use, handling and storage. These requirements apply to tools provided by AECOM for employee use as well as tools provided by employees for use on AECOM work sites.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-302-PR1 Electrical Safety

3.5 S3AM-325-PR1 Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers/Supervisors**

- Ensure that all aspects of this procedure are followed and adhered to on all AECOM projects, sites and locations.
- If a specific tool is not included in the work instructions related to this procedure, appropriate guidelines shall be established prior to work associated with that tool, including following manufacturer's recommendations.
- Ensure compliance with applicable client requirements and restrictions regarding hand or power tools.

4.1.2 **Safety, Health and Environment (SH&E) Manager**

- Provide technical guidance and support as to this procedure and associated work instructions.

4.1.3 **Employees**

- Work only with tools for which they are appropriately trained and familiar with.
- Follow manufacturer's recommendations for its use and never modify the equipment without first obtaining authorization from the manufacturer.
- Comply with applicable client requirements and restrictions regarding hand or power tools.

4.2 Requirements

4.2.1 Always conduct a task hazard assessment (THA) prior to work commencing and include the identified hazards associated with the anticipated tool use.

4.2.2 No employee shall use any hand or power tool, unless they are familiar with the use and operation of the equipment or have received specific instruction on its use and operation.

4.2.3 All tools will be used for which they were designed and in accordance with manufacturer's specifications. Do not use tools for jobs they are not intended for. For example, do not use a slot screw driver as a chisel, pry bar, wedge or punch or wrenches as hammers.

4.2.4 Use approved tools only. Never modify or use makeshift tools.

4.2.5 Do not apply excessive force or pressure on tools unless permitted by the manufacturer's specifications. This includes additional force by hammering with body weight, foot or other tools.

4.2.6 Keep surfaces and handles clean and free of excess oil and grease to prevent slipping.

4.2.7 Do not carry sharp tools (e.g. knife, chisel, screwdriver, etc.) in pockets; this practice may cause puncture wounds.

4.2.8 All tools shall be properly maintained. Clean, dry, lubricate and repair tools as applicable, and return to a suitable toolbox, room, rack, or other storage area upon completion of a job.

4.2.9 Ensure proper ergonomics principles are observed when using hand and power tools, such as but not limited to:

- Avoid static and awkward positions when possible.
    - Move at intervals to reduce muscle fatigue.
    - Consider tools with a trigger strip, rather than a trigger button. This strip will allow the exertion of more force over a greater area of the hand that, in turn, will reduce muscle fatigue
- Do not apply excessive force or pressure on tools.
- If possible use tools with comfortable grips that are designed to allow the wrist to stay straight. Avoid using a bent wrist.
- Choose hand tools that have a centre of gravity within or close to the handle.
- Frequently used tools that weigh more than 1 pound (0.45 kilograms) should be counter-balanced.
- Ensure proper body positioning when using a tool to prevent slips or falls in the event of unanticipated tool behaviour (slip, kickback, etc.). Avoid over-reaching.
- Pull on tools such as a wrench or pliers whenever possible. Loss of balance is more likely when pushing if the tool slips. If pushing is necessary, hold the tool with an open palm.
- Hand-arm vibration exposure is associated with the use of hand tools.
    - Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
    - Consider the need for controls such as limiting time of use.
    - If safe to do so, adjust to a looser but stable grip, and use anti-vibration gloves.
- Use of heavy tools such as jackhammers can cause fatigue and strains. Heavy rubber grips can reduce these effects by providing a secure handhold.
- Do not increase a tool's leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.

4.2.10 Avoid placing fingers and hands in danger zones:

- Ensure hands and fingers have sufficient clearance in the event the tool slips.
- Ensure stability of the work-piece. Use work-piece holders (e.g. vise, chisel holder, etc.) whenever possible to prevent injury to hands or deflection of tool or work-piece.

- Use push sticks or guides when cutting or machining smaller material.

4.2.11 Secure tools when working from heights to prevent them from falling. Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use.

4.2.12 Utilize good housekeeping practices to ensure tools do not present a tripping hazard.

4.2.13 Ensure no part of a tool extends over the edge of the bench top. Place sharp tools (e.g., saws, chisels, knives) on benches so that sharp points or edges face away from the edge.

4.2.14 When using saw blades, knives, or other tools, if possible direct the tools away from aisle areas and away from other employees working in close proximity.

4.2.15 Do not throw tools from place to place or from person to person, or drop tools from heights. Hand them, handle first, directly to other workers.

4.2.16 Use non-sparking and intrinsically safe tools in atmospheres with flammable or explosive characteristics and where highly volatile liquids, and other explosive substances are stored or used.

- Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials shall be used.
- Electrical tools shall be identified as intrinsically safe.

4.2.17 If the task presents electrical hazards, worker must be competent and use the appropriate insulated tools to perform work that includes the risk of electrical shock. Cushioned grip handles do not protect against electrical shock.

4.2.18 The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

4.2.19 All tools designed to accommodate guards must have the guard(s) in place when the tool is in use. Do not modify, remove, or disable any machine guards.

4.2.20 Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.

4.2.21 Make provisions to prevent tools from automatically restarting upon restoration of power. Refer to *S3AM-325-PR Lockout Tagout*.

4.3 Training

4.3.1 Instruction in the proper use, safe handling, and maintenance of tools will be provided to employees unfamiliar with the tool.

- Assess the employee's training needs as per *S3AM-003-PR1 SH&E Training* procedure.
- Refer to the applicable work instructions associated with this procedure for any additional training specifics.
- Training shall include applicable manufacturer's recommendations and guidelines.

4.3.2 Employees shall demonstrate knowledge and competency in the use, safe handling and maintenance of the applicable tool prior to operation.

4.4 Personal Protective Equipment (PPE)

4.4.1 Utilize basic PPE appropriate to the task; gloves, safety-toed boots, hard hats and safety glasses with side shields. Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.4.2 Ensure lockout devices (padlocks, multiple lock hasps, tags) are utilized as necessary. Refer to *S3AM-325-PR Lockout Tagout*.

4.4.3 Ensure PPE is appropriate to the work and use additional PPE as required (e.g. mono-goggles, hearing protection, respiratory protection, etc.).

- Dual eye protection is required to be worn by any employee undertaking or within 3 ½ feet (1 meter) of a task that produces projected particles or material.
- Head and face protection is recommended for employees working with pneumatic tools.
- Noise hazard is associated with pneumatic and many other tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

4.4.4 Screens shall also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

4.4.5 Refer to the applicable work instructions associated with this procedure for any additional specialized PPE.

4.5 Inspections

4.5.1 All tools must be inspected prior to each use.

- Any tool that is defective or has missing parts must not be used.
- Every broken or defective tool must be tagged ‘out of service’ or ‘do not use’ and immediately removed from service.
- Tagged tools will be returned to the supervisor for repair or replacement.

4.5.2 All tools must be inspected to manufacture’s specifications and according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly. Refer to *S3AM-305-FM1 Hand & Power Tool Maintenance Inventory* and *S3AM-305-FM2 Hand & Power Tool Inspection Report*.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-305-ATT1 Chainsaw

6.2 S3AM-305-ATT2 Circular Saw

6.3 S3AM-305-ATT3 Cut Off Saw

6.4 S3AM-305-ATT4 Handheld Grinder

6.5 S3AM-305-ATT5 Impact Wrench

6.6 S3AM-305-ATT6 Nail Gun

6.7 S3AM-305-ATT7 Dustless Vacuum

6.8 S3AM-305-ATT8 Power Drill

6.9 S3AM-305-ATT9 Pressure Washer

6.10 S3AM-305-ATT10 Reciprocating Saw

6.11 S3AM-305-ATT11 Sander

6.12 S3AM-305-ATT12 Knives

6.13 S3AM-305-ATT13 Clearing & Grubbing Equipment

6.14 S3AM-305-ATT14 Pneumatic Tools

6.15 S3AM-305-ATT15 Manual Hand Tools

6.16 S3AM-305-ATT16 Small Engines

6.17 S3AM-305-ATT17 Electric & Battery Hand Tools

6.18 S3AM-305-FM1 Hand & Power Tool Maintenance Inventory

6.19 S3AM-305-FM2 Hand & Power Tool Inspection Report

Americas

Heavy Equipment

S3AM-309-PR1

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near heavy equipment and heavy equipment operation.

1.2 Military related vehicles and equipment (e.g. tanks) are not covered under this standard.

1.3 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Heavy equipment** –All excavating equipment (e.g. scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, graders, agricultural and industrial tractors, etc.), cranes, lift trucks, drills, etc. This may include off-highway trucks (e.g. dump truck, heavy haul truck, etc.). For requirements related to crew trucks refer to *S3AM-005-PR1 Driving*.

2.2 **Operator** – Any person who operates the controls while the heavy equipment is in motion or the engine is running.

2.3 **Ground personnel/workers** – Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 References

3.1 S3AM-005-PR1 Driving

3.2 S3AM-202-PR1 Competent Person Designation

3.3 S3AM-213-PR1 Subcontractor Management

3.4 S3AM-303-PR1 Excavation

3.5 S3AM-322-PR1 Overhead Lines

3.6 S3AM-325-PR1 Lockout Tagout

3.7 S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for confirming all equipment is in good working order and all equipment operators are verified as qualified on the piece of machinery they are assigned.
- As applicable, review as-built drawings.
- Maintain operation manuals at the site for each piece of equipment that is present on the site and in use.
- Maintain a list of operators for the project, and the specific equipment that they are authorized to operate.
- Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.

- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Confirm subcontractors are properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management.*
- Require that subcontractor employees follow established safety procedures in operation, inspection, and maintenance of vehicles and equipment.
- Inform AECOM and subcontractor machinery operators about applicable local regulations restricting the consecutive minutes of engine idling time allowed.
- Confirm subcontractor machinery and mechanized equipment is approved for use in accordance with the requirements of *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*.
- Confirm that all rented equipment bears any required current certification marks and arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Confirm that AECOM and subcontractor machinery and mechanized equipment is certified, as applicable, in accordance with manufacturer specifications and/or regulatory requirements.
- Visually observe the subcontractors' vehicles and equipment, for any unsafe conditions or practices. Equipment or operation not in compliance with applicable safety standards is prohibited.

4.1.2 **Employees / Ground Personnel**

- Confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Ground personnel when working in the vicinity of heavy equipment shall have received training, and comply with the applicable rules of engagement.

4.1.3 **Operators (of heavy equipment)**

- Operate the equipment safely, maintain full control of the equipment, and comply with manufacturer's operation manual and the laws governing the operation of the equipment.
- Inspect equipment and immediately report defects and conditions affecting the safe operation of the equipment to the appropriate Supervisor.
- Trainees may operate equipment in accordance with jurisdictional requirements and under the direct supervision of a trainer.

4.2 Communication

4.2.1 Communication between site Managers / Supervisors, heavy equipment Operators, and site Employees / Ground Personnel is a key method of preventing serious injury or death during heavy equipment operations.

4.2.2 Managers shall confirm the Industrial site or project specific SH&E Plan is developed and communicated to all affected and involved employees. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.3 Task Hazard Assessments and Daily Tailgate meetings shall be conducted in accordance with *S3AM-209-PR1 Risk Assessment & Management.*

4.2.4 Concerning worksites in which other employers control concurrent operations and SH&E issues related to the worksite, the manager shall coordinate with those conducting concurrent operations to confirm appropriate control measures are in place to protect employees from the hazards associated with activities to be performed.

- Coordination shall occur prior to work commencing, periodically thereafter, and as necessary given changes in scope and/or working conditions.
- Affected employees (including managers and supervisors) shall seek to participate in all site SH&E meetings related to concurrent operations.

4.2.5 The following points outline the communication requirements during heavy equipment operations:

- Site Supervisors/t Managers shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.
- Site Supervisors/ Managers shall inform all ground personnel before changes are made in the locations of designated work areas.
- Prior to work initiating on site, the Site Supervisor/ Manager is to confirm all operators and ground personnel are trained on the hand signals that will be used to communicate between operators and ground personnel.
- Ground Personnel working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (e.g., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a signal person shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.3 Ground Personnel

4.3.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.3.2 The following points outline the clearance requirements during heavy equipment operations:

- Ground Personnel shall always yield to heavy equipment.
- Ground Personnel shall maintain a suitable “buffer” area of clearance from all active heavy equipment.
- A task hazard assessment that identifies any special precautions shall be completed and communicated to all AECOM personnel associated with or affected by the activity.
- Site Supervisors/ Managers shall designate areas of heavy equipment operation and confirm that all ground personnel are aware of designated areas.
    - Designated areas shall include work zone boundaries and travel routes for heavy equipment.
    - Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
    - Work zone boundaries shall consider line of fire hazards related to the equipment and associated activities. Refer also to *S3AM-309-ATT2 Operator Line of Sight.*
    - If working near heavy equipment, Ground Personnel shall stay clear of loads to be lifted or suspended loads, and out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
    - During winch use, all swampers or other personnel will remain outside the “whip area” of the winch line or tow cable.

- At a minimum, employees shall maintain a distance of at least two pile lengths from where piles are being cut and dropped, other than in situations where cut piles are being guided to the ground utilizing mechanical means (e.g., pile driver and shackle) to control the direction and speed of fall of the cut pile.

- When feasible, Site Supervisors/ Managers shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and confirm that unauthorized ground personnel do not enter such areas.
- Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
- Ground Personnel shall never stand between two pieces of operating heavy equipment or other objects (e.g., steel support beams, trees, buildings, etc.).
- Ground Personnel shall never stand directly below heavy equipment located on higher ground unless it can be verified ground stability is not a factor and grade of slope is such that it would not contribute to equipment tip-over.
- Ground Personnel may only enter the swing area, work area or path of travel of any operating equipment when:
  - They have attracted the operator's attention and established eye contact, and
  - The operator has idled the equipment down, placed it in neutral, grounded engaging tools, set brakes and communicated entry is permitted.
- Employees shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- Employees shall not talk, text, or otherwise use a cell phone while standing or walking on a roadway or other heavy equipment path.

4.3.3 At a minimum, all Ground Personnel and Operators outside of heavy equipment shall wear the following:

- High visibility safety vest (fluorescent background material and retro-reflective striping) meeting jurisdictional requirements that is visible from all angles.
  - Background material: should be fluorescent yellow-green, fluorescent orange-red or fluorescent red.
  - Combined-performance retro-reflective material (e.g. the stripes): should be fluorescent yellow-green, fluorescent orange-red or fluorescent red - and shall be in contrast (that is, have a distinct color difference) to the background material.
  - Hazards may require high visibility garments that cover torso, legs and arms.
  - Confirm that vest is not faded or covered with outer garments, dirt, etc.
- American National Standards Institute/Canadian Standards Association- (ANSI/CSA-) approved hard hat
- ANSI/CSA-approved safety glasses with side shields
- At a minimum, CSA or ASTM approved, high-cut (min. 6"), puncture, impact and compression resistant footwear.
- ANSI/CSA-approved hearing protection as needed
- Appropriate work clothes (e.g., full-length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).

4.4 Prior to work commencing

4.4.1 All heavy equipment will be inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.

- Roll-over protection systems (ROPS) and appropriate overhead protection (Fall Object Protection FOP) shall be in place given the specific equipment requirements. Utilize equipment with enclosed cabs where feasible or accessible.
    - Where use of equipment with enclosed cabs is not feasible or said equipment is not accessible, operators shall use any additional personal protective equipment determined as necessary (e.g. goggles, additional hearing protection, etc.).
- Equipment operated in hazardous atmosphere environments shall be equipped with the proper safety equipment (e.g., spark arrestors, positive air shut off, etc.).
- Operation of equipment that has or had cab glass (per the manufacturer's specifications) that is cracked/broken (obstructing the operator's view) or missing is prohibited.
- A locking device shall be provided that will prevent the accidental separation of towed and towing vehicles on every fifth-wheel mechanism and two-bar arrangement.
- Trip handles for tailgates of dump trucks and heavy equipment shall be arranged so that when dumping, the operator will be in the clear.
- The Operator will report defects and conditions affecting the safe operation of the equipment to the Site Supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.
- Exposed moving parts on heavy equipment (belts, gears, shafts, pulleys, sprockets, spindles, drums, fan belts, flywheels, chains, or other reciprocating, rotating or moving parts) which are a hazard to the operator or to other workers will be guarded.
    - If a part will be exposed for proper function it will be guarded as much as is practicable consistent with the intended function of the component.

4.4.2 An approved 4A40BC fire extinguisher shall be present on all heavy equipment. An approved 4A40BC fire extinguisher of appropriate rating shall be present and readily accessible on all heavy equipment.

- Fire extinguishers shall be inspected by the operator prior to heavy equipment operation each shift. Monthly and annual inspections shall be documented.

4.4.3 All Operators shall inspect the area adjacent to the machine prior to starting.

- Evaluate ground conditions, concurrent operations and obstructions to identify approved routes of travel and work areas.
- As applicable, check that there is sufficient swing room and that the outriggers are adequately supported on solid and stable ground

4.4.4 Managers / Supervisors shall inform the operators of the equipment that AECOM employees are in the area and inquire if there are any restricted areas or specific rules or requirements. In some industrial facilities, heavy equipment has the 'right of way'.

4.4.5 Where the Operator will not have a full view of the path of travel, a signal person will be used on the ground that has a full view of the load, the operator, and the path.

4.4.6 All heavy equipment with limited visibility (operator cannot directly or by mirror or other effective device see immediately behind the machine) operated around workers or on a construction site:

- Shall have an audible back-up alarm installed that functions automatically when the vehicle or equipment is put into rear motion.

- All bi-directional equipment shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction.
- Backing up or movement in both directions for bidirectional equipment shall occur only when a signal person communicates that it is safe to do so if alarms or horns are not feasible.

4.5 Operation

4.5.1 The Operator of heavy equipment is the only worker permitted to ride the equipment unless the equipment is equipped by the manufacturer for passengers. Manufacturer operator's manual shall be complied with.

4.5.2 A person will not operate heavy equipment unless the person has received adequate instruction and training in the safe use of the equipment, and has demonstrated to a qualified supervisor or instructor competency in operating the equipment.

- Oilers, apprentices, and other operators will not be allowed to operate equipment unless authorized by the Manager.

4.5.3 The Operator of heavy equipment will operate the equipment safely, maintain full control of the equipment, and comply with the manufacturer's operator manual and the laws governing the operation of the equipment.

- Operation of company-owned, leased, or rented vehicles or equipment while under the influence of alcohol or illegal drugs or otherwise impaired is prohibited.
- Do not operate any equipment beyond its safe load or operational limits.
- Operator shall not talk on, text, or otherwise use mobile phones while operating heavy equipment.
- Never use bucket teeth or boom for lifting or moving heavy objects.

4.5.4 When heavy equipment is used for lifting or hoisting or similar operations there shall be a permanently affixed notation stating the safe working load capacity of the equipment and the notation shall be kept legible and clearly visible to the operator.

4.5.5 A Supervisor or Manager will not knowingly operate or permit a worker to operate heavy equipment which is, or could create, an undue hazard to the health or safety of any person. Where compliance is refused, the Manager or his or her designate should be notified immediately.

4.5.6 The Operator of heavy equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement.

- The Operator is not to leave suspended load, machine or part or extension unattended, unless it has been immobilized and secured against inadvertent movement.
- Turn off heavy equipment, place gear in neutral and set parking brake prior to leaving vehicle unattended.
- Buckets and blades are to be placed on the ground and with hydraulic gears in neutral when not in use.
- Brakes shall be set and, as necessary, wheels chocked or equivalent (as applicable) when not in use.

4.5.7 The Operator will maintain the cab, floor and deck of heavy equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.

4.5.8 If heavy equipment has seat belts required by law or manufacturer's specifications, the Operator and passengers will use the belts whenever the equipment is in motion, or engaged in an operation which could cause the equipment to become unstable.

- Seat belts shall be maintained in functional condition, and replaced when necessary to ensure proper performance.

4.5.9 All vehicles transporting material or equipment on public roads shall comply with local laws pertaining to weight, height, length, and width. Obtain any permits required for these loads.

4.5.10 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.

4.5.11 Never exit heavy equipment while it is in motion.

4.5.12 Do not ride with arms or legs outside of the truck body of equipment cab.

- Never ride on the outside of a piece of heavy equipment (e.g. in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck bed, on the load, bucket, etc.).

4.5.13 Have vehicle headlights on at all times when driving in the area.

4.5.14 Park motor vehicles off the haul roads, or away from the work areas.

4.5.15 Do not wear loose clothing or jewelry where there is a danger of entanglement in rotating equipment.

4.5.16 Do not enter the swing area of machines such as cranes, heavy drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so. Refer to *S3AM-309-ATT2 Operator Line of Sight.*

4.5.17 Stay out of the blind areas around heavy equipment and never assume that the equipment operators have seen you or are aware of your presence.

4.5.18 Maintain a distance of at least 2 feet (60 centimeters) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, a spotter shall observe and be in constant communication with the operator to prevent contact.

4.5.19 Vibrations from moving traffic or heavy equipment can cause excavations or spoil piles to become unstable.

- Excavation activity shall be conducted according to *SOP S3AM-303-PR1 Excavation*.
- Equipment not involved in the excavating activity or not required to be in the vicinity shall keep clear. Equipment that shall operate in the vicinity shall maintain appropriate setback distances from edges of excavations or spoil piles.

4.5.20 All heavy equipment shall be operated in a safe manner that will not endanger persons or property.

- When ascending or descending grades in excess of 5 percent, loaded equipment shall be driven with the load upgrade.
- When operating an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating, refer to the *S3AM-309-ATT1 Brokk 180* for more specifics.

4.5.21 All heavy equipment shall be operated at safe speeds. Do not drive any vehicle at a speed greater than is reasonable and safe for weather conditions, traffic, intersections, width, and character of the roadway, type of motor vehicles, and any other existing condition.

4.5.22 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.

4.5.23 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.

4.5.24 When feasible, Operators shall travel with the “load trailing”, if the load obstructs the forward view of the operator.

4.5.25 Slow down and sound horn when approaching a blind curve or intersection. Signal people equipped with 2-way radio communications may be required to adequately control traffic.

4.5.26 All haulage equipment / trucks, whose payload is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cable shield and/or canopy adequate to protect the operator from shifting or falling material. If protection is not available for the operator, the operator shall leave the vehicle and wait in a designated safe location until it is loaded..

4.5.27 Equipment shall be shut down prior to and during fueling.

- Confirm proper grounding/ bonding between equipment and fuel vehicle prior to fueling operations.
- During fuel operations confirm fuel nozzle remains in contact with the tank.
- Do not smoke, use electrical devices or have an open flame present while fueling.
- Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.

4.5.28 Site vehicles will be parked in a designated parking location away from heavy equipment.

4.5.29 Operators shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.

4.5.30 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.

4.5.31 Equipment left unattended at night adjacent to travelled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (1.8m) (or the regulatory requirement for the work location) to the active roadway.

4.5.32 Rubber / pneumatic-tired earthmoving haulage equipment shall be equipped with fenders on all wheels. Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

4.5.33 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not to be exceeded.

4.5.34 Steering or spinner knobs shall not be attached to steering wheels.

4.5.35 High-lift rider industrial trucks shall be equipped with overhead guards.

4.5.36 All hot surfaces of equipment, including exhaust pipes or other lines, that present a possible injury or fire hazard, shall be guarded or insulated.

4.5.37 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

4.5.38 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

4.5.39 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.5.40 In an effort to reduce air emissions, fuel costs, and run-time hours (that can impact equipment warranty), operators shall limit heavy equipment engine idling to not more than five consecutive minutes. Local regulations at the location of the vehicle operation could require less than five consecutive minutes idling time. The idling limit does not apply to:

- Idling when queuing.
- Idling to verify that the vehicle is in safe operating condition.

- Idling for testing, servicing, repairing or diagnostic purposes.
- Idling necessary to accomplish work for which the vehicle was designed (cranes, man-lifts, forklifts, etc.)
- Idling required to bring equipment/vehicle to operating temperature, as specified by the manufacturer. Engine heaters shall be used for cold weather starting to avoid engine idling where feasible.
- Idling necessary to ensure safe operation of the vehicle.
- Idling to keep equipment (including windows) clear of ice and snow.
- Idling to provide air conditioning or heat to ensure the health and safety of the operator, but only when seated inside the equipment or vehicle.

4.6 Utilities

4.6.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. Refer to the *S3AM-322-PR1 Overhead Lines* procedure for more specifics.

4.6.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities.
- Confirm all equipment (e.g., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath aboveground utilities.
- Confirm utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work. Confirm documentation of the contact is made; date, number; contact name, organization, etc. Refer to *SOP S3AM-303-PR1 Excavation* and *S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance.*

4.7 Training

4.7.1 The Operator or other qualified supervisor will provide all on-site personnel with an orientation to the heavy equipment and its associated hazards and controls.

4.7.2 Only designated, qualified personnel shall operate heavy equipment.

4.7.3 Operators shall have all appropriate jurisdictional licenses or training to operate a designated piece of heavy equipment.

4.7.4 Operators shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is required. Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.8 Inspection and Maintenance

4.8.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel regulatory agencies upon request during work hours.

4.8.2 Maintenance records will be maintained on the site or project for heavy equipment.

4.8.3 Conduct maintenance as prescribed by the manufacturer in the Operation Manual for each piece of equipment.

4.8.4 Servicing, maintenance and repair of heavy equipment will not be done when the equipment is operating.

- Lockout and tagout safety procedures are followed. Refer to *S3AM-325-PR1 Lockout Tagout*.

- Motors are turned off, unless required for performing maintenance or repair.
- All ground-engaging tools are grounded or securely blocked.
- Controls are set in a neutral position and brakes are set.
- Electrically driven equipment is installed with provision for tagging and locking out the controls while under repair.
- Manufacturer's requirements for maintenance and repair are followed.
- If continued operation is essential to the process, a safe means of protection shall be provided.
- Provide and use a safety tire rack, cage, or equivalent protection when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

4.8.5 All heavy equipment shall have a documented inspection and if necessary, repaired prior to use.

- Operators shall not operate heavy equipment that has not been cleared for use.
- All machinery and mechanized equipment will be verified to be in safe operating condition (refer to *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*) by a competent person (refer to *S3AM-202-PR1 Competent Person Designation*) within seven days prior to operation on a new site or project. Clearance is valid for up to one year for the given site or project.
- As applicable, all machinery and mechanized equipment shall be inspected / certified and tested at appropriate intervals as required by the manufacturer and/or regulatory requirements.

4.8.6 All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the Supervisor/ Manager immediately.

- Defective heavy equipment shall be immediately tagged and taken out of service until repaired.
- Inspection, maintenance, service and repair records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use *S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist*.
- Records shall be made available for review upon request. Note: Documents may be electronically stored in the project files.

4.9 Fueling and batteries

4.9.1 A well-ventilated area shall be used for refueling.

4.9.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.

4.9.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.

4.9.4 If there is potential to spill fuel on hot surfaces, the surfaces shall be permitted to cool down prior to fueling. Any spillage shall be cleaned before starting engine.

4.9.5 Spilled fuel shall be cleaned with cotton rags or cloths and disposed of in the proper receptacle; do not use wool or metallic cloth.

4.9.6 Open flames, lighted smoking materials, sparking equipment or any other type of ignition source shall remain a minimum of 35' (10.7m) from the fueling area and/or fuel source. This clearance shall be increased if required or conditions warrant.

4.9.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.

4.9.8 Portable containers to be filled shall be placed directly on the ground or be properly grounded prior to filling to prevent creation of a static charge. Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.

4.9.9 Control electrostatic hazards.

- Before activating fuel pump, touch some part of vehicle / equipment to de-energize any static electricity that may be present.
- The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent build-up of a static charge.

4.9.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

4.9.11 Batteries shall be serviced in a ventilated area while wearing appropriate Personal Protective Equipment.

4.9.12 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first. Consult the SDS applicable to the battery and/or contents for additional information including; handling, precautions, and first aid measures.

- Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water. Battery storage or maintenance areas shall have readily accessible eye wash stations.
- Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention shall be sought immediately.

4.9.13 When installing a battery, the battery shall be connected ground post last.

4.9.14 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.

4.9.15 When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.

4.9.16 To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around batteries by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least a minimum of 35 feet (10.7 meters) away from battery-charging stations.

5.0 Records

5.1 Inspection, maintenance, service and repair records shall be maintained with the equipment.

6.0 Attachments

6.1 S3AM-309-ATT1 Brokk180 Safety Card

6.2 S3AM-309-ATT2 Operator Line of Sight

6.3 S3AM-309-FM1 Approval of Machinery & Mechanized Equipment

6.4 S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist

6.5 S3AM-309-FM3 Rubber Tire Backhoe Operator Skill Evaluation

6.6 S3AM-309-FM4 Scraper Operator Skill Evaluation

6.7 S3AM-309-FM5 Bull Dozer Operator Skill Evaluation

6.8 S3AM-309-FM6 Dump Truck Operator Skill Evaluation

6.9 S3AM-309-FM7 Roller Compactor Operator Skill Evaluation

6.10 S3AM-309-FM8 Front End Loader Operator Skill Evaluation

6.11 S3AM-309-FM9 Grader Operator Skill Evaluation

6.12 S3AM-309-FM 10 Excavator Operator Skill Evaluation

6.13 S3AM-309-FM11 Water Truck Operator Skill Evaluation

6.14 S3AM-309-FM12 Heavy Equipment Maintenance Inventory

6.15 S3AM-309-FM13 Heavy Equipment Inspection Report

Americas

Wildlife, Plants & Insects

S3AM-313-PR1

1.0 Purpose and Scope

1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as “biological hazards”.

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document’s content.

2.0 Terms and Definitions

2.1 **Field Work –** Any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance, biological surveys, and other work that meets the definition of field work.

2.2 **Poisonous** – Capable of harming or killing by or as if by poison; toxic or venomous.

2.3 **Phase I Environmental Site Assessment –** Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of Comprehensive Environmental Response, Compensation, and Liability Act defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called “All Appropriate Inquiry” or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.

2.4 **Phase II Environmental Site Assessment** – Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 References

3.1 RS2-001-PR1 Firearms Standard

3.2 S3AM-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3AM-008-PR1 Fitness for Duty

3.4 S3AM-113-PR1 Heat Stress

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for managing field work.

- Work with employees to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- Implement control measures at the location to reduce the potential for employees to be exposed to injuries and illnesses from biological hazards while working.
- If the exposures cannot be eliminated or managed with engineering controls, approve the use and cost of Personal Protective Equipment (PPE) and protective repellents and lotions and confirm that exposed employees have and use these products.

4.1.2 **SH&E Manager**

- Confirm training and guidance is provided to employees consistent with this procedure.
- During the performance of site visits, assess the precautions being taken against biological hazards for compliance with this procedure.
- Assist AECOM personnel in identifying hazards and selecting appropriate control measures.
- As applicable, review and approve relevant SH&E Plans for locations that have biological hazards.

4.1.3 **Employees**

- Participate in required training related this procedure.
- Participate in the development of THAs for the task, identify control measures to limit exposure and request PPE, repellents, and protective lotions identified by this procedure.
- Update the applicable THA when a new, unaccounted for biological hazard is identified. Employee shall stop work to identify appropriate elimination or control measures (and obtain any necessary guidance) before continuing work.
- Obtain approval from Managers and/or Supervisors to purchase selected PPE prior to purchasing.
- Implement the precautions appropriate to prevent exposure to the hazardous wildlife, insects and plants.
- Observe requirements for reporting (e.g. tick bites, skin irritations, etc.) as detailed within the procedure and attachments.

4.2 Training

4.2.1 Employees shall be trained to recognize organisms that represent a threat in the regions in which they work – experienced field staff shall provide on the job training to assist staff with hazard recognition.

4.2.2 Employees shall be properly trained to the anticipated tasks and the associated required PPE.

4.3 Overview

4.3.1 The procedures discussed below are detailed because these hazards have historically posed the most significant risk to AECOM employees. Note that this discussion is not a fully encompassing list of hazards. As part of the SH&E Plan and THA developed by the AECOM personnel, in accordance with *S3AM-209-PR1 Risk Assessment & Management*, additional consideration shall be given to other biological hazards.

4.3.2 Departments of Public Health local to the worksite, as well as the Centers for Disease Control (CDC) can serve as a resource for identifying biological hazards not discussed in this procedure.

4.3.3 If additional biological hazards are identified, employees should stop work and contact the SH&E Manager to discuss the hazards and identify effective control measures. Those control measures shall be implemented at the location prior to restarting work.

4.4 Employee Sensitivity

4.4.1 Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin; therefore, it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Employees should be aware that there are a large number of organisms capable of causing serious irritations and allergic reactions. Some reactions will only erupt if a secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can be severe scarring, blindness or even death.

4.4.2 Employees also need to consider whether they are sensitive to the use of insect repellents.

4.5 Planning and Hazard Assessment

4.5.1 AECOM personnel shall confirm that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this procedure are integrated into the THA planning process and conveyed to employees conducting the field work. This information shall be communicated in the location-specific SH&E plan, the THA, pre-project kickoff meetings, and tailgate meetings at the location.

4.5.2 It is important to note that the precautions to be taken by employees to decrease the risk of exposure to biological hazards can directly increase the risk of heat-related illness due to thermal stresses. Therefore, heat stress monitoring and precautions shall be included as a critical component of the task-specific THA in accordance with *S3AM-511-PR1 Heat Stress.*

4.5.3 During the preparation of the location-specific SH&E plan and task specific THA, Managers, Supervisors, and employees shall determine what biological hazards might be encountered during the task or operations and shall prescribe the precautions to be taken to reduce the potential for exposure and the severity of resulting illnesses. Consideration will be given to conditions such as weather, proximity to breeding areas, host animals, and published information discussing the presence of the hazards.

4.5.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40 degrees Fahrenheit (4.5 degrees Celsius) for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.

4.5.5 The hazard assessments shall also consider the additional hazards posed by vegetative clearing such as the increased risk of coming in contact with poison ivy, oak or sumac and hazards associated with the use of tools and equipment to remove vegetation.

4.5.6 Employees in the field where biological hazards exist shall not enter the hazard areas unless they are wearing the appropriate protective clothing, repellents, and barrier creams specified below. If the hazard is recognized in the field but was not adequately assessed during the THA, the field staff shall stop work and not proceed until the THA has been amended and approved and protective measures implemented.

4.5.7 Employees who have severe allergic reactions are strongly recommended to notify their Manager, field Supervisor and co-workers of the potential for a reaction and demonstrate what medication they might need, where they keep it and how it is administered.

4.5.8 A decision flow chart and table for determining the potential for biological hazards in the Americas has been provided in *S3AM-313-ATT1 Biological Hazard Assessment Flow Chart.*

4.5.9 Restrictions:

- No firearms or weapons are allowed to be used without express permission by the Region Executive and Chief Resilience Officer, refer to the *RS2-001-PR1 Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training.

- Staff with life-threatening reactions shall not undertake work in areas infested with the allergen (e.g., wasps, poison ivy), unless precautions are met which satisfy a medical practitioner's requirements. Refer to *S3AM-008-PR1 Fitness for Duty*.

4.5.10 Precautions

- Be aware of the potential irritants in your area and know how to recognize them.
- Modify activities to avoid encounters (diurnal rhythms, seasonal rhythms).
- Avoid wearing perfume and cologne and strong smelling deodorants, lotions, soaps, and shampoos.
- When working in areas where there may be small insects that "hitchhike" (e.g., ticks, spiders, scorpions), it is recommended that clothes are turned inside out and shaken at the end of day; do not wear same clothes two days in a row.
- Staff should always be aware of where they are placing their hands, or where they are sitting in order to avoid contact with potential toxins. Avoid reaching into areas where visibility is limited.

4.6 Wildlife Hazards (Wild Animals, Reptiles and Birds)

4.6.1 Employees shall not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling shall only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics:

- *S3AM-313-ATT13 Alligators*
- *S3AM-313-ATT9 Large Carnivores & Ungulates*
- *S3AM-313-ATT10 Bear Safety*
- *S3AM-313-ATT11 Small Mammals*
- *S3AM-313-ATT12 Snakes & Scorpions*

4.7 Ticks, Spiders and other Insects

4.7.1 Insects for which precautionary measures should be taken include but are not limited to: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, fire ants and European fire ants.

4.7.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. Epi-pens[1] shall be carried at all times in the field by employees who are aware that anaphylactic shock is a possibility for them AECOM highly recommends that employees with known allergies inform their co-workers of the allergy and the location of the medications they might carry for the allergy.

4.7.3 Habitat Avoidance, Elimination and/or Control

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the location of brush, high grass and foliage reduces the potential for exposure to biological hazards. Clearing will not eliminate the exposure to flying insects and there might be an increased exposure to ticks and spiders during the clearing process.
- Projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the Manager shall either request that the client eliminate vegetation, or request approval from the client to have vegetation clearing added to the scope of work.
    - It should be noted that vegetation clearance may unintentionally serve to spread noxious and poisonous plant materials around the site.

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[1] Epi-pens must be prescribed by a personal physician. Renew epi-pens on a regular schedule to ensure effectiveness and make sure your field companions know where it is and how to use it if you cannot self-administer the dose.

- As applicable, measures should be taken to prevent spread, such as but not limited to, confirming equipment and materials are not placed on affected areas, and equipment is decontaminated after use and before removal from site.

- When work shall be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile (less than half a kilometer) from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. Managers and client site managers should be contacted to determine whether water can be drained and the most appropriate method for draining containers, containment areas, and other objects of standing water.
- If water cannot be drained, products similar to Mosquito Dunks® can be placed in the water to control mosquitoes. Once wet, the Mosquito Dunks® kill the immature, aquatic stage of the mosquito. The active ingredient is a beneficial organism that is lethal to mosquito larvae, but harmless to fish, humans, and other animals. Mosquito Dunks® provide long-term protection for 30 days or more.

4.7.4 Ticks

- Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will attach themselves. The most serious concern is a possibility of contracting a disease.
- Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and, therefore, most related illnesses. The use of permethrin is strongly advised.
- The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in *S3AM-313-ATT2 Ticks* along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.
- When working in areas where ticks may occur, it is recommended that clothes are turned inside out and shaken at the end of day; do not wear the same clothes two days in a row.
- Employees should conduct a thorough full body tick check upon exiting the field. Shower within two hours of coming indoors to help wash away loose ticks. Clothes should be laundered in hot water or tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks.
- To remove ticks that are embedded in skin, utilize a tick key. Alternatively use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Follow AECOM incident reporting guidelines to report the tick bite within 4 hours and notify the Manager or Supervisor.
- Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If you notice this type of pattern or rash resulting from a tick bite, immediately report the issue to your supervisor and follow the incident reporting requirements for your business group.
- If you experience symptoms such as fever, headache, fatigue, and a skin rash, you should immediately visit a medical practitioner as Lyme disease is treated easily with antibiotics in the early stages, but can spread to the heart, joints, and nervous system if left untreated.

4.7.5 Chiggers

- Chiggers are mite larvae, approximately ½ millimeter in size, and typically invisible to the naked eye. While chiggers are not known to carry infectious diseases, their bites and resulting rashes and itching can lead to dermatitis and a secondary infection.
- Chiggers are typically active from the last hard freeze in the winter or spring to the first hard freeze. They are active all year in the Gulf Coast and tropical areas.

4.7.6 Spiders

- Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the U.S. and others outside the U.S. inject a toxin that causes extensive tissue damage and intense pain.
- Additional information on spider identification can be found in attachment *S3AM-313-ATT3 Poisonous Spider Identification*.

4.7.7 Mosquitoes

- When a mosquito bites, it injects an enzyme that breaks down blood capillaries and acts as an anticoagulant. The enzymes induce an immune response in the host that results in itching and local inflammation. The tendency to scratch the bite sites can lead to secondary infections.
- CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:
    - Eastern Equine encephalitis
    - Western Equine encephalitis
    - West Nile Virus
    - St. Louis encephalitis
    - La Crosse encephalitis
- Mosquitoes can transmit the West Nile Virus and other forms of encephalitis after becoming infected by feeding on the blood of birds which carry the virus.
- Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death, so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus. Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3AM-313-ATT4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.7.8 Bees, Wasps and Hornets

- Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground. Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously. Avoid reaching into areas where visibility is limited.
- If you see a nest in the area you are working in stop work. Contact the Manager or Site Supervisor for procedures to have the nest removed.

- If stung by a wasp, bee or hornet, notify a co-worker or someone who can help should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Follow AECOM incident reporting guidelines to report the sting within 4 hours and notify the Manager or Supervisor immediately. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.

4.7.9 Fire Ants

- The fire ant (southern and western U.S.) and the European fire ant (northeastern U.S. and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

4.7.10 Personal Protective Equipment (PPE)

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Gloves shall also be worn consistent with the recommendations of the site-specific SWP and/or THA to minimize hand exposure.
- Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.
- See *S3AM-313-ATT2 Ticks* for configuration of clothing for protection against ticks and insects.
- Application of insect repellent to clothing and/or exposed skin. Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
- Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, employees can use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work. If permethrin is unavailable employees can apply DEET to their skin and let dry prior to putting FRC on.
    - Oil of Lemon Eucalyptus is a plant-based insect repellent on the market as Repel Lemon Eucalyptus. The products have been proven to be effective against mosquitoes, deer ticks, and no-see-ums for up to six hours. Derived from Oil of Lemon Eucalyptus, this non-greasy lotion or spray has a pleasant scent and is not known to be toxic to humans. The spray or lotions will be effective for approximately two to six hours and should be reapplied every two hours to sustain protection. Lemon Eucalyptus products cannot be applied to fire retardant clothing.
    - Permethrin is an insecticide with repellent properties registered with the Environmental Protection Agency and recommended by the CDC.
        - Permethrin is highly effective in preventing tick bites when applied to clothing, but is not effective when applied directly to the skin. Two options are available for Permethrin treatment of clothing worn during field work: 1) pre-treatment of fabric by the clothing manufacturer; or 2) manual treatment of their personal clothing using Permethrin spray in accordance with recommendations manufacturers recommendations. This will likely require treatment at home or the office prior to field mobilization. Caution should be used when applying Permethrin as it is highly toxic to fish and house cats. AECOM strongly recommends the first option (employees obtaining pre-treated clothing) to avoid the time required, potential risk, and housekeeping issues involved with manually treating the clothing with spray. Purchase pre-treated clothing in accordance with *S3AM-208-PR1 Personal Protective Equipment* and with the approval of your Supervisor or Manager.
        - The Permethrin pre-treatment is odorless and retains its effectiveness for approximately 25 washings. After 25 washings, the pre-treated clothing will be

considered no longer effective and removed from service. Clothing that has been manually treated by employees will be considered effective for five wash cycles.

- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that shall be applied directly to the skin. Supervisor or Manager approval is required prior to purchase.
- If the employee opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they shall either: 1) wear Tyvek® coveralls taped to the boots, or 2) wear full-length clothing consisting of long-legged pants and long-sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an oil of lemon eucalyptus to their work clothing.
- Safety Data Sheets (SDS) for the repellents, lotions, and cleansers discussed in this Procedure are not required because the repellents, lotion, and clothing are consumer products used in the manner intended for the general public. Although not required, a SDS should be obtained for the products used and placed into the office SDS library and site-specific safety plan.

4.8 Poisonous Plants

4.8.1 Habitat Avoidance, Elimination and/or Control

- If poisonous plants are identified in the work area, employees will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other employees to avoid the designated area. If employees decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the Manager (and Client as appropriate) for approval.
- If removal of the plants is considered, it should be subcontracted to a professional landscaping service that is capable and experienced in removing the plant. If herbicides are considered for use, a discussion shall need to occur with the Manager (and Client as appropriate) to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- Employees shall not attempt to physically remove poisonous plants from the work area unless a clearing procedure, including PPE, is prepared in advance and approved by the SH&E Manager. The clearing procedure should be included in the SH&E Plan and THA and the required PPE specified.

4.8.2

Poisonous plants that employees should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed[2] (or giant cow parsnip), wild parsnip, devil's club and stinging nettle. Many others are extremely poisonous to eat (e.g., poison hemlock; water parsnip) – do not eat anything that has not been identified. Refer to *S3AM-313-ATT5 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows in a variety of forms such as a low sprawling shrub, dense ground cover, or a thick woody vine that grows high into the tree canopy. Poison oak (*Rhus diversiloba*) is typically a low shrub in drier soils. Both of these plants have leaves of three and white berries. Poison sumac (*Rhus vernix*) is a tall shrub that is less prolific in distribution. It grows in wet areas, has a compound leaf with a red leaf stem (rachis), and white berries. All of these plants possess urushiol oils in all parts of the plant. Touching the plant causes an itchy skin rash that can show up within 4-72 hours following contact. People have a wide range of reactions including swelling, itching, rash and bumps, patches or blisters.
- Uroshiol oil can also transfer onto clothing and equipment. The oil can remain active on surfaces for up to 5 years and can be transferred to your skin.

[2] Phytodermatisi producer: keep skin covered and wash well after exposure

- Wild parsnip is found throughout the U.S. and contains a poison that produces a rash similar to poison oak and ivy. Unlike poison oak and ivy, the active oil will not be present on unbroken leaves. See *S3AM-313-ATT6 Wild Parsnip Identification* for additional information and photos of wild parsnip.
- Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the giant hogweed (*Heracleum mantegazzianum*), a plant that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 16 feet (5 meters) in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by meadow parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum lanatum*). Meadow parsnip can be very abundant on disturbed sites.
- Nettles, particularly stinging nettle (*Urtica dioica*) and wood nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.
- Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. These include the cactus (*Opuntia spp.*), devils club (*Oplopanax horridum*), and prickly-ash (*Zanthoxylon americanum*).

4.8.3 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying to not eat any berries or plants if you are unsure of their identity.

- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.

4.8.4 Personal Protective Equipment (PPE)

- Employees conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. Employees shall not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants shall be treated as contaminated, removed from the body in a manner that the contamination is not spread, and placed in plastic bags for disposal.
- Personal clothing that has been exposed to poisonous plants shall be decontaminated with a poisonous plant cleanser such as Tecnu® or removed in a careful manner, bagged and washed separately from other clothing to remove urushiol.
- Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
- If foliage is being cleared and includes poisonous plants, exposed skin shall be treated with a dermal barrier cream such as Tecnu®'s Oak 'n Ivy Armor or Enviroderm's Ivy Block and either a full-face respirator or a half-face respirator (with goggles) fitted with a P-100 (HEPA) dust filter.

4.9 Bird Droppings and Biological Soil Hazards

4.9.1 Work in any area where pigeons or other flying animals (e.g. bats) may nest requires a written statement from the client which states the potential for, and extent of, accumulation of excrement on/in the structure from pigeons or other winged animals.

4.9.2 Substantial accumulations of droppings can pose physical and health risks as slippery surfaces (if wet) and if the material is disturbed and becomes airborne, it can be inhaled or ingested if personal hygiene practices are not implemented. Inhalation of airborne droppings can cause diseases such as histoplasmosis. Exposure to surfaces with bird droppings shall be safeguarded by implementing proper work practices, training employees for awareness and using PPE. See *S3AM-313-ATT8 Bird Droppings*.

4.9.3 Tularemia is a problem with contaminated soil in some locations. Tularemia is a disease of animals and humans caused by the bacterium *Francisella tularensis*. Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Workers can contract Tularemia through tick and deer fly bites, but also through inhalation of contaminated aerosols or agricultural dusts. Check work areas for carcasses before disturbing the ground (e.g. mowing, brushing, grubbing, excavation, etc.).

4.10 Personal Hygiene and Body Checks

4.10.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.

4.10.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.

4.10.3 Employees shall shower as soon as practical after working in the field and examine their bodies for the presence of ticks, insect bites, rashes, or swollen areas. If imbedded ticks are found, they should be removed using the technique described in *S3AM-313-ATT2 Ticks*.

4.11 Employees shall immediately notify their Manager or Supervisor of the presence of an imbedded tick, bee, wasp or hornet sting, other insect bite, rash, or any abnormal reaction. Reporting shall occur within 4 hours for a significant incident and 24 hours for all other SH&E incidents, and in accordance with *S3AM-004-PR Incident Reporting, Notifications & Investigation.*

4.12 The Manager or Supervisor shall forward the report to the SH&E Manager for follow up.

5.0 Records

None

6.0 Attachments

6.1 S3AM-313-ATT1 Biological Hazard Assessment Flow Chart

6.2 S3AM-313-ATT2 Ticks

6.3 S3AM-313-ATT3 Poisonous Spider Identification

6.4 S3AM-313-ATT4 Mosquito Borne Diseases

6.5 S3AM-313-ATT5 Plants of Concern

6.6 S3AM-313-ATT6 Wild Parsnip Identification

6.7 S3AM-313-ATT7 Alligators

6.8 S3AM-313-ATT8 Bird Droppings

6.9 S3AM-313-ATT9 Large Carnivores & Ungulates

6.10 S3AM-313-ATT10 Bear Safety

6.11 S3AM-313-ATT11 Small Mammals

6.12 S3AM-313-ATT12 Snakes & Scorpions

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content where the potential for hand injuries is present.

1.2 This procedure is intended to protect employees from activities that may expose them to hand injury. This procedure provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

1.3 All personnel shall have gloves in their immediate possession 100% of the time when in a shop or on a work site. Appropriate gloves shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-208-PR1 – Personal Protective Equipment

3.3 S3AM-209-PR1 – Risk Assessment & Management

3.4 S3AM-325-PR1 – Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Implementation of this standard for the applicable facility, site, or project location.
- Confirm employees are familiar with this procedure and have appropriate training.
- Confirm the appropriate hand protection is available on site as necessary.

4.1.2 **Employees**

- Recognize hazards to hands.
- Comply with this procedure as well as client or work location requirements.

4.1.3 **SH&E Manager**

- Advise supervisors and site personnel on matters relating to hand safety.
- Work with the manager / supervisor to confirm that sufficient PPE and equipment are available.
- Maintain contact with manager / supervisor to regularly evaluate site conditions and new information that might require modifications to this procedure.
- Conduct training or briefings, when necessary, and to explain the content of this procedure and site hazards to employees.

- Assist in investigation of incidents that resulted or could have resulted in an injury.

4.2 Hazard Assessment

4.2.1 Perform hazard assessments for those work activities likely to require Personal Protective Equipment (PPE).

- Use the Task Hazard Assessment (THA) to perform the hazard assessment (in accordance with *S3AM-209-PR1 Risk Assessment & Management*). The THA will accompany AECOM personnel at jobsites for use in the event of a job or task change, or
- Use the *Gloves Needs Assessment – S3AM-317-FM1* or equivalent to perform the assessment.
- Re-evaluate completed hazard assessments when the job or task changes.

4.2.2 The hierarchy of controls should be considered during the THA process to minimize or eliminate the need for hand protection PPE or material handling tools. Examples of controls are chemical substitution, machine guarding, and use of different tools.

4.2.3 Select PPE that will protect employees if hazards cannot be eliminated.

- Review Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with a SH&E Manager for assistance.
- Review glove manufacturer recommendations for both physical and chemical protection.
- Obtain gloves of the correct size for the employees.
- When both chemical and physical protection is of concern, wear the chemical protection gloves (e.g., nitrile) inside the physical protection gloves (e.g., leather, Kevlar®).
- Nitrile gloves or equivalent chemical resistant shall always be used for protection from hazardous fluids or non-corrosive chemicals.
- Do not wear metal or metal-reinforced gloves when working with electrical equipment or on electrical services. Proper leather and/or rubber gloves designed and tested for this purpose shall be used.
- Refer to *S3AM-208-PR1 – Personal Protective Equipment* for additional information.

4.2.4 Follow glove requirements in the applicable SH&E plan.

4.3 Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)

4.3.1 General

- As applicable, employees shall be trained in the use of all tools. Refer to *S3AM-003-PR1 SH&E Training*.
- Keep hand and power tools in good repair and use them only for the task for which they were designed.
- Inspect tools before use and remove damaged or defective tools from service.
- Operate tools in accordance with manufacturer's instructions.
- Do not remove or bypass a guarding device for any reason.
- Keep surfaces and handles clean and free of excess oil to prevent slipping.
- Do not carry sharp tools in pockets.
- Clean tools and return to the toolbox or storage area upon completion of a job.

- Confirm that the wrench is in full contact (fully seated, "flat", not tilted) with the nut or bolt before applying pressure.
    - Place the body in the proper position for optimal balance and bracing to prevent falls if the tool slips.
    - Make sure hands and fingers have sufficient clearance in the event the tool slips.
    - Whenever possible, pull on a wrench and avoid pushing.
- When working with tools overhead, place tools in a holding receptacle when not in use.
- Do not throw tools from place to place or from person to person, or drop tools from heights.
- Inspect all tools prior to start-up or use to identify any defects.
- Powered hand tools shall not be capable of being locked in the ON position.
- Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
- Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools or rotating equipment.
- Do not increase the leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.
- Make provisions to prevent machines from restarting through proper lockout/tagout (refer to *S3AM-325-PR1 – Lockout Tagout*).

4.3.2 Cutting Tools

- Always use the specific tool designed for the task. Tubing cutters, snips, self-retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see *S3AM-317-ATT1 Safe Alternative Tools.*
- Fixed open-blade knives (FOBK) are prohibited from use during the course of AECOM work.
    - Examples of fixed open-blade knives include pocket knives, multi-tools, hunting knives, and standard utility knives.
    - Any exception to this requirement shall require approval of the Manager / Supervisor and SH&E Manager.
- When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
    - Use the correct tool and correct size tool for the job.
    - Cut in a direction away from yourself and not toward other workers in the area.
    - Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
    - Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
    - Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
    - On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
    - Do not remove guards on paper cutters.
    - In office locations, paper cutters must always be kept in a locked position when not in use.

4.3.3 Moving/Rotating Equipment

- General Requirements for Rotating Equipment (feed augers, chippers, conveyors, etc.)

- Never place hands, fingers, or extremities near hoppers and operational areas of machinery.
- When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.
- Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, locked out, and the moving parts of the equipment have stopped rotating. Refer to *S3AM-325-PR1 – Lockout Tagout*.

4.3.4 Other Physical Hazards

- Activities such as drum handling, fencing, work near razor wire, manhole cover removal, and demolition also pose hazards to hands. Use tools instead of hands for high hazard tasks whenever possible.
- Plan work to avoid pinch points for hands when moving drums, moving manhole covers into position, and handling other heavy objects.
- Work handling scrap metal, glass or other sharp edges requires proper hand PPE (Kevlar® or leather gloves).
- Activities involving hoisting, lifting and landing of a load shall be done "hands-free" when possible. Refer to *S3AM-317-ATT2 – Safe Hands-Free Lifting Guidelines*.

4.4 Ergonomics – Hand and Wrist Care

4.4.1 Keep your wrist in neutral. Avoid using your wrist in a bent (flexed), extended, or twisted position for long periods of time. Instead try to maintain a neutral (straight) wrist position. Ergonomic tools may be needed for long-term work.

4.4.2 Watch your grip. Gripping, grasping, or lifting with the thumb and index finger can put stress on your wrist. When practical, use the whole hand and all the fingers to grasp an object.

4.4.3 Minimize repetition. Even simple, light tasks may eventually cause injury. If possible, avoid repetitive movements or holding an object in the same way for extended periods of time.

4.4.4 Reduce speed and force. Reducing the speed with which you do a forceful, repetitive movement gives your wrist time to recover from the effort. Using power tools helps reduce the force.

4.4.5 Rest your hands. Periodically give your hands a break by letting them rest briefly. Or you may be able to alternate easy and hard tasks, switch hands, or rotate work activities.

4.4.6 Consider low vibration or anti- vibration hand power tools when possible.

4.5 Cleaning Hands

4.5.1 Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.

4.5.2 Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.

4.5.3 If the hands contact a corrosive (e.g., nitric acid), wash the area with water for fifteen minutes and then seek medical attention.

4.5.4 Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.

4.5.5 In some cases barrier creams may be used to provide limited protection for hands exposed to greases and oils.

4.6 Safe Hands Observation Tool

4.6.1 The *Safe Hand Task Review Card S3AM-317-FM2* may be used to supplement and reinforce safe work practices and the requirements of this procedure.

4.6.2 The observer's responsibilities include:

- Two-way conversation with the employees being observed.
- Completing the card and mark the applicable fields on the back of the card.
- Submitting the completed cards to the supervisor.

4.6.3 The supervisor's responsibilities include:

- Reviewing the completed cards.
- Identifying best work practices and any improvements.
- Communicating any changes back the employee(s).

5.0 Records

The following documentation will be maintained:

5.1 Hand tool training records, as applicable.

6.0 Attachments

6.1 S3AM-317-FM1 Glove Needs Assessment

6.2 S3AM-317-FM2 Safe Hands Task Review Card

6.3 S3AM-317-ATT1 Safe Alternative Tools

6.4 S3AM-317-ATT2 Safe Hands-Free Lifting Guidelines

Americas

Drilling, Boring & Direct Push Probing

S3AM-321-PR1

1.0 Purpose and Scope

1.1 This document provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with drilling, boring and direct-push probing. These hazards include, but are not limited to, encountering underground utilities, subsurface installations, rotating equipment and potential overhead hazards.

1.2 This procedure provides the minimum requirements to be followed when drilling, boring, and probing work are performed.

1.3 This procedure applies to all Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling, and communications, etc.

2.2 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.3 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits / trenches or other man-made cuts, cavity, trench, or depression in an earth surface formed by earth removal.

2.4 **Subsurface Installations –** Examples: Subterranean tunnels, underground parking garages, and other structures beneath the surface.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protection Equipment

3.4 S3AM-209-PR1 Risk Assessment & Management

3.5 S3AM-213-PR1 Subcontractor Management

3.6 S3AM-305-PR1 Hand & Power Tools

3.7 S3AM-306-PR1 Highway and Road Work

3.8 S3AM-322-PR1 Overhead Lines

3.9 S3AM-322-FM1 Overhead Electrical Lines Acknowledgement

3.10 S3AM-325-PR1 Lockout Tagout

3.11 S3AM-326-PR1 Machine Guarding

3.12 S3AM-331-PR1 Underground Utilities

3.13 S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Confirm the development of the project SH&E Plan and compliance with this procedure.
- Confirm the appropriate equipment and materials are available to conduct the drilling, boring or direct-push operations.
- Confirm compliance with *S3AM-331-PR1 Underground Utilities.*
- Review the *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* prior to authorizing work to proceed.
- Confirm that employees conducting drilling, boring or direct-push probing possess any required training, registrations or certifications.
- Confirm all employees involved and affected by the task review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

4.1.2 **Safety, Health & Environment (SH&E) Manager**

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the project SH&E Plan to confirm compliance with jurisdictional regulations**.** Provide technical guidance as needed when a variance is pursued related to this procedure. Confirm variance process meets requirements identified in *S2-001-SM1 Global SH&E Management System Manual*.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g., ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training.*
- Review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and / or repairs.

4.2 Training

4.2.1 All on-site employees involved with drilling, boring, and direct-push probing shall be trained, at a minimum, in these procedures and in the procedures of *S3AM-331-PR1 Underground Utilities*.

4.2.2 All operators and assistants shall have the appropriate safety training based on the SH&E Training Matrix and any additional training assessments developed at the business group**,** and be versed in the equipment to be utilized.

- Refer to *S3AM-003-PR1 SH&E Training.*

- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.
- Only qualified personnel shall operate and inspect equipment.

4.2.3 All on-site Employees involved with drilling, boring, and direct-push probing activities shall be provided with on-site orientation of the drill rig and its operation.

4.2.4 All Employees involved with drilling, boring and direct-push probing activities at a client site shall receive the applicable client-required training**.**

4.3 Planning

4.3.1 SH&E Plan – At a minimum, a SH&E plan that includes a pre-job hazard assessment shall be prepared and communicated to all involved personnel prior to any drilling, boring, and direct-push probing activities. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

- Assessment shall include both overhead and subsurface utilities and installations. Refer to *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities*.
- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- All SH&E Plan requirements will be followed by the project team.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 A Task Hazard Assessment (THA) shall be completed before every assigned task at the work location. The focus of the analysis shall be on the specific assigned task and the evaluation of risks and assignment of control measures based on actual work conditions.

4.3.3 *S3AM-321- ATT2 Pre-Drilling, Boring & Direct-Push Probing Flow Chart* summarizes the key Pre-Drilling, Boring, and Direct-push probing requirements addressed in this procedure.

4.3.4 Procedures and documentation as detailed in *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities* shall be completed prior to any intrusive subsurface work.

- The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, mapped on a site plan and evidenced with appropriate surface markings.
- A site walk shall be conducted by the project team / site Manager and any other appropriate personnel, with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.
- All proposed subsurface activities will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.
- Appropriate clearance activities shall confirm location(s) of identified underground utilities and subsurface structures. Review the applicable completed *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.*
- Site Walks should be repeated as necessary following the clearance of subsurface utilities and installations to confirm hazards are clearly identified.

4.3.5 Confirm drilling location(s) and / or bore entry and bore exit points are adequately identified on the worksite to enable appropriate equipment positioning.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 Access agreements will be obtained and adhered to as necessary.

4.5 Pre-Qualifying and Re-Qualifying Drilling Subcontractors

4.5.1 All drilling subcontractors will be properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management*.

4.5.2 The qualifications of the drilling crew performing the work will be evaluated prior to each mobilization and each day by AECOM's on-site representative to assure that their safety performance, training, qualifications, equipment, processes, and approaches reflect AECOM standards for excellence.

4.5.3 All drilling subcontractor equipment will be properly maintained and properly equipped, and the drilling subcontractor will verify their equipment is fully functional as a normal part of their daily and pre-work routine. Refer to *S3AM-321-FM1 Daily Drilling, Boring & Direct Push Equipment Inspection.*

4.6 General Health and Safety

4.6.1 Personal Protective Equipment – Refer to the *S3AM-208-PR1 Personal Protection Equipment* for best practices. These requirements may be modified or expanded in the SH&E Plan. Clothing shall be close fitting and comfortable without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the rig.

- Depending upon the hazards present, additional PPE may be required such as fire retardant clothing, specific hearing protection, respiratory protective equipment and chemical protective clothing.
- If the location has potential for underground electrical utilities to be present, workers shall ensure footwear has additional protection of shock resistant soles required (white rectangle with omega symbol).

4.6.2 Hearing Conservation – Hearing conservation program requirements may apply when working around operating equipment. Refer to *S3AM-118-PR1 Hearing Conservation*.

- Each worker shall wear noise-reducing ear protectors around operating equipment or during elevated noise levels. Distance from the elevated noise level is the primary measure of control for non-essential drilling personnel.

4.7 Drilling, Boring and Direct Push Equipment Maintenance and Inspections

4.7.1 All equipment will be inspected prior to the initiation of operations and daily during operations using the *S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection*. This inspection is the responsibility of the operator who will provide written documentation of the inspection prior to the start of drilling each day.

- Equipment that is deemed defective will immediately be repaired by a qualified person, or, if repair is not practicable, tagged "Out of Service" and sent for repairs or discarded.

4.7.2 Managers shall confirm an accurate inventory of the equipment within their operation requiring scheduled maintenance is developed. Using applicable regulations, industry standards, best practices, and manufacturer's recommendations, a maintenance schedule shall be developed with defined responsibility, required actions, and frequency. Refer to *S3AM-321-FM2 Drilling, Boring, & Direct-Push Equipment Maintenance Inventory.*

4.7.3 The maintenance program for equipment shall:

- Adhere to applicable regulations, standards, and manufacturers' specifications;
- Provide for service by appropriately qualified maintenance personnel; and,
- Require maintenance schedules and records of maintenance.

4.7.4 Employees or operators who are assigned equipment are required to review maintenance schedules for that equipment and will confirm that required maintenance has occurred or see that it is undertaken.

4.8 General Requirements

4.8.1 Excluding geoprobe activities, set up any sample tables and general work areas for employees at a safe distance from the rig.

- The recommended safe distance is the height of the fully extended mast plus 5 feet (1.5 meters), and no less than 30 feet (9.1 meters) from the rig.
- An increase to this distance may be required due to noise exposure hazards. Refer to *S3AM-118-PR1Hearing Conservation.*

4.8.2 Operation of the drilling, boring or direct-push equipment shall be restricted to the designated operator except to activate the emergency shut-off as required.

- All rotary drilling equipment shall have an emergency shut off / kill switch. The location of the switch and operation should be reviewed with all involved Employees.

4.8.3 Sit-on direct push rigs are not permitted on AECOM worksites unless the rig has been modified (in accordance with manufacturer's requirements) to be operated by remote control or the rig has been manufactured with a rollover protection system and seat belt.

4.8.4 Consult jurisdictional regulations as use of J-hooks and cat-heads may be prohibited. Examples:

- 29 CFR 1926 requires derricks and cranes to use hooks with self-closing latches and permits the use of J-hooks only for a task unrelated to this procedure (setting trusses).
- British Columbia and Saskatchewan prohibit the use of friction cat-heads**.**

4.9 Identifying the Work Area

4.9.1 Ensure the work area is adequately identified:

- Including zone around the drilling, boring, or direct push equipment, as well as fluid equipment, entry point, exit point and any excavated areas.
- Utilize barricades, signage, pylons, snow fence, etc. as appropriate.
- Implement traffic control as necessary.
- Coordinate with concurrent operations to identify their associated hazards and controls, and communicate those associated with AECOM tasks.

4.9.2 When operating near public vehicular and pedestrian traffic, the on-site personnel shall take every precaution necessary to see that the work zone is properly established, identified, and isolated from both moving traffic and passer-by pedestrians (refer to *S3AM-306-PR1 Highway and Road Work*).

4.9.3 All traffic control devices shall be installed, placed, and maintained in accordance with a Traffic Control Plan, client specifications, and / or the Manual of Uniform Traffic Control Devices and Manual of Uniform Traffic Control Devices for Canada in Canada. Traffic control devices shall consist of and not be limited to

- Directional and informational signage;
- High visibility barricades, cones, or barrels;
- Lighting; and
- Other equipment and devices as required.

4.10 Clearing Work Areas

4.10.1 In addition to any minimum requirements the drilling subcontractor may have, prior to set up, adequate site clearing and leveling shall be performed to accommodate the rig and supplies and provide a safe working area.

4.10.2 Clearing the site includes clearing the intended drilling area obstacles and of underground utilities in accordance with *S3AM-331-PR1 Underground Utilities*.

4.10.3 Drilling or probing shall not commence when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

- The cleared / levelled area should be large enough to accommodate the rig and supplies.
- If the rig is positioned on a steep grade and levelling of the ground is impossible or impractical, the wheel of the transport vehicle shall be blocked and other means employed of preventing the rig from moving or toppling over.

4.11 Drilling Activities

4.11.1 Federal / State / Provincial / Territorial regulations that govern drill rig operations and exposed moving parts shall be adhered to.

4.11.2 All applicable client on-site safety procedures shall be understood and adhered to.

4.11.3 Minimum approach distances (MAD) from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These approach distances are a minimum; government regulations and utility requirements may dictate a greater set back distance and should be confirmed.

4.11.4 Verify that equipment / energy is isolated when lockout is required:

- Refer to operator's manual and *S3AM-325-PR1 Lockout Tagout*.
- Ensure stop switch is activated.
- Driller is out of the seat.
- Test controls to ensure they do not engage.

4.11.5 In addition to any identified minimum requirements (as applicable, client, drilling subcontractor), the following safety measures shall be taken during drilling, boring or probing operations on site:

- The operator and helper shall be present during all active rig operations.
- Site personnel shall remain within visual contact of the rig operator.
- Hard hats, approved safety boots, safety glasses, and hearing protection shall be worn in the work zone (minimum, the radius around the rig equal to the height of the drill rig mast) of a rig.
- Gas monitoring shall be conducted as appropriate.
- Hands, feet and other body parts shall be kept away from moving parts, (e.g. hoisted, rotating, pushing, etc.) including augers, drill rods and reamers.
- When observing drilling, stand upwind of the drill rig to prevent potential exposure to vapors that may be emitted from the borehole.
- The emergency shut-off switch on the rig shall be identified to site personnel and tested on a daily basis by the operator.
- Unauthorized personnel shall be kept outside of the established work zone.
- Rig crew and other worksite personnel shall not use a cell phone while operating the drill rig or other equipment or within the rig work zone.
- Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick) look up to check for overhead obstructions. Refer to *S3AM-322-PR1 Overhead Lines*.

- Before raising the mast (derrick), all rig personnel (with the exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the mast. All rig personnel and visitors should be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig shall be first levelled and stabilized with levelling jacks and / or solid cribbing.
    - The drill rig shall be releveled if it settles after initial set up.
    - Lower the mast (derrick) only when the levelling jacks are down, and do not raise the levelling jack pads until the mast (derrick) is lowered completely.
- After the rig has been positioned to begin drilling, all brakes and / or locks shall be set before drilling begins.
- The operator of a rig shall only operate a drill rig from the position of the controls. The rig shall not be in operation if the operator of the rig leaves the area of the controls.
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line should be used.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area.
    - Exhaust fumes can be toxic and some cannot be detected by smell.
    - Air monitoring and, as necessary, noise monitoring shall be conducted.
- Clean mud and grease from boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes shall be covered, protected, or backfilled adequately and according to Federal / State / Provincial / Territorial or local regulations on completion of the drilling project.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending and descending. Always use adequate fall protection and a full body harness when climbing above 6 feet (1.8 meters) of the ground. Do not attempt to use one or both hands to carry a tool while on a ladder. Use a hoist line and a tool “bucket” or a safety hook to raise or lower hand tools.

4.12 Drilling Fluid

4.12.1 Ensure drilling fluid is appropriate to the soil type and conditions to be encountered to enable smooth drilling.

4.12.2 Drilling fluid used in the boring process shall be contained at the entry and, as applicable, exit locations until recycled or removed from the site.

4.12.3 Confirm drilling fluid does not enter roadways, streams, municipal storm or sanitary sewer lines, and / or any other drainage system or body of water.

4.12.4 Monitor drilling equipment and fluid equipment for any leakage or spills. Confirm appropriate containment is in place and adequate spill response supplies are available.

4.12.5 It is important to monitor fluid flow and pressure gauges when drilling with any tooling, but it is essential when drilling with a mud motor (pump placed in the drill string to provide additional power to the bit while drilling).

4.13 Unanticipated Concrete / Debris or Void

4.13.1 The presence of subsurface installations and utilities requires special care when obstructions / refusal and voids are encountered and when unexpected absence of soil recovery occurs during

drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.

4.13.2 If unanticipated concrete / debris is encountered and / or if a void is encountered, drilling will be immediately discontinued and the Manager notified. Drilling may only proceed with Manager or SH&E Manager approval.

4.14 Use of Manual Slide Hammer

4.14.1 The following health and safety procedures should be followed when using a manual slide hammer to install shallow injection points, drive point piezometers, and drill tools:

- Only use a manual slide hammer that either attaches directly to the point / piezometer being driven or that incorporates a cap on the point / piezometer / drill tool that prevents the slide hammer from slipping off the point / piezometer / drill tool.
- Always grasp the manual slide hammer (handles if equipped with handles) with both hands while driving the point / piezometer / drill tool.
- Never allow hands or feet to get between the manual slide hammer and the drive plate or anvil.

4.15 Use of Augers

4.15.1 The following general health and safety procedures should be followed when supervising borings with continuous flight hollow-stem augers:

- Never place hands or fingers under the bottom of an auger section when it is being hoisted over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When augers are rotating, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Use a long-handled shovel to move auger cuttings away from a rotating auger. Never use hands or feet to move cuttings away from a rotating auger.
- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.
- Loud noises may occur while driving split spoons. At minimum hearing protection shall be worn when driving split spoons.
- When pulling / lifting augers, a clevis pin or other closed device shall be used. Use of J-hooks is prohibited.

4.16 Attaching and Breaking Rods

4.16.1 Do not use manual tools (e.g., pipe wrenches) in combination with rotation of the drill stem. Manual tools are not designed for the load, and may break.

- The use of such tools creates a significant impact hazard for those in the work area, because they rotate with the drill stem. Manual tool use in combination with a rotating drill stem to attach or break rods is therefore prohibited.
- Manual tools may be used if the drill stem is isolated / positively disengaged.
- Mechanical means of rod separation that are permitted include:
  - Opposing hydraulic controls.
  - Rod locking devices or machine's power vice.
  - Hydraulic breakout tools.
  - Hydraulic foot clamps.

4.16.2 Rod box changes present severe crushing hazards. Operators shall ensure all crew members are clear of the machine and hoisting equipment while they are changing rod boxes.

4.17 Rotary, Sonic and Core Drilling

4.17.1 In addition to the health and safety procedures identified above, the following general health and safety procedures should be followed when supervising borings with rotary, sonic and core drilling:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- When drill rods are rotating, stay clear of the rotating components of the drill rig. Never reach behind or around a rotating drill rod for any reason.
- Use a long-handled shovel to move cuttings away from the top of the borehole. Never use hands or feet to move cuttings away from the borehole.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Keep away from area where drill rods are being moved or raised to the rig. Do not stand in the area where a drill rod will fall or slide if it should be dropped.
- Loud noises may occur during drilling. Hearing protection shall be worn.

4.18 Direct-push

4.18.1 The following general health and safety procedures should be followed when supervising drilling borings with direct-push drilling:

- Loud noise may occur during direct-push drilling. Appropriate hearing protection shall be worn.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

4.19 Horizontal Directional Drilling

4.19.1 During surface to surface operations a 16.4’ (5 meters) safe zone shall be established and identified at both the entry and exit locations; no personnel are permitted to be within this zone unless the drill is locked out and the operator is out of the seat.

4.19.2 Machine shall be locked out before entering an excavation, changing tools, adding or removing drill stem or doing any other work on tools or the drill stem at the exit end of the bore.

4.19.3 A tracking head shall be installed on the drill stem:

4.19.4 Assemble drill head using components appropriate to the soil conditions to be encountered (e.g. nozzle, bit, beacon housing, etc.).

4.19.5 Ensure all personnel are clear of the bore entry point (outside of identified work zone).

4.19.6 At all times two way communication will be maintained at entrance and exit points using two way radios or equally effective communication means. If at any time communication is lost, all work will be stopped until communication is re-established

4.19.7 Locate drill head with tracking device at least every half-length of pipe. Adjust direction as necessary to follow the intended bore path.

4.19.8 Any drilling fluid returning to the surface shall be cleaned up promptly.

4.19.9 Drill pipe should exit the bore at an angle of 5 to 10° from the ground surface.

4.19.10 Turn off fluid flow as soon as drill head emerges.

4.19.11 Lockout machine and remove drill head using appropriate breakout tools.

4.19.12 Select and attach a reamer that allows the return of drilling fluids and cuttings, to reduce frictional pullback forces, and to allow for bend radius of the pipe. Reamer shall be:

- The smaller of 1.5 times the outside diameter (O.D.) or 12 inches (300mm) larger than the diameter of the product pipe.
- A diameter less than 1.5 times the diameter of the product may be necessary in collapsing soil formations.
- Reamed diameter may need to be increased by up to 25% if substantial swelling of the soil is expected to occur.

4.19.13 All personnel shall clear the trench or the designated surface zone (16.4 feet [5 meters]) once the reamer is attached. Operator shall only reverse lockout and commence pullback when communication is received from personnel on exit hole side and operator has confirmed the message.

4.19.14 Personnel on exit hole side shall ensure reamer is pulled the entire way back to the exit hole.

- If rotation is started when drill rod and reamer are away from the exit hole, very fast sideways movement of the rod and reamer can occur.
- Larger reamers and longer lengths of exposed drill rod increase the speed and distance of this movement.

4.19.15 If working with trailing drill stem, swivels shall be verified as lubricated and rotating freely by hand prior to use:

- A freely moving swivel prevents trailing drill stem or product from rotating / whipping.
- If the swivel does not move freely by hand it shall be removed from service and repaired or replaced.
- Only use swivels with limited articulation to prevent whipping or cranking action between the reamer and trailing drill pipe or product.

4.19.16 It is important to clean and lubricate the tool and drill stem joint threads before each use.

4.19.17 Any individual drill pipes that are bent or damaged shall be immediately taken out of service.

4.19.18 Occasionally change the order of the lead drill pipe (i.e. move the lead pipe to the end of the stem, or other pipe rotation procedures) to extend drill stem life.

4.19.19 Operator should avoid stalling the pipe rotation to avoid stress damage from shock loading.

4.20 Drilling at Potential MEC / UXO Sites

4.20.1 If the project site is suspected of containing munitions and explosives of concern (MEC) or unexploded ordnance (UXO), the UXO team will conduct a reconnaissance and MEC / UXO avoidance to provide clear access routes to each site before drilling crews enter the area. The following procedures will be implemented:

- Drilling operations on an MEC / UXO site will not be conducted until a complete plan for the site is prepared and approved by the AECOM UXO Safety Officer. MEC / UXO avoidance shall be conducted during drilling operations on known or suspect MEC / UXO sites.
- The UXO team will identify and distinctly mark the boundaries of a clear approach path for the drilling crews, vehicles, and equipment to enter the site. This path will be, at a minimum, twice the width of the widest vehicle. No personnel will be allowed outside any marked boundary.
- If MEC / UXO is encountered on the ground surface, the UXO team will clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
- The UXO team will conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of MEC / UXO that may be in the subsurface. If a magnetic anomaly is encountered, it will be assumed to be MEC / UXO, and the approach path will be diverted around the anomaly. UXO personnel only will operate the appropriate geophysical instrument and identify MEC / UXO.
- An incremental geophysical survey of the drill-hole location(s) will be initially accomplished by the UXO team using a hand auger to install a pilot hole. If MEC / UXO is encountered or an anomaly cannot be positively identified as inert material, Hazardous, Toxic, and Radioactive Waste (HTRW) sampling personnel will select a new drill-hole location.
- Once the surface of a drilling site has been cleared and a pilot hole established as described above, the drilling contractor will be notified that the site is available for subsurface drilling.

4.21 Movement and Transport of Drilling, Boring or Direct-Push Equipment

4.21.1 Personnel transporting equipment shall be properly licensed and shall operate the vehicle according to Federal / State / Provincial / Territorial, and local regulations. Refer to *S3AM-005-PR1 Driving* and *S3AM-320-PR1 Commercial Motor Vehicles*.

4.21.2 Confirm the traveling height (overhead clearance), width, length and weight of the equipment with the carrier. Identify highway and bridge load, width and overhead limits, to confirm these limits are not exceeded and with adequate margin.

4.21.3 Allow for overhang of any drilling, boring or direct-push equipment when cornering or approaching other vehicles or structures.

4.21.4 Be aware that the canopies of service stations and motels are often too low for equipment loaded on a trailer to clear

4.21.5 Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.

4.21.6 Never travel on a street, road, or highway with any part of the drilling, boring or direct-push equipment in a raised or partially raised position.

4.21.7 Remove all ignition keys if rig is left unattended unless client requirements specify that the keys remain in the ignition switch at all times.

4.21.8 Before moving a rig on location, the operator shall do the following:

- To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
- Check the brakes of the truck / carrier, especially if the terrain along the route of travel is rough or sloped.
- Discharge all passengers before moving on rough or steep terrain.

4.21.9 Engage the front axle (on 4x4, 6x6, etc., vehicles) before traversing rough or steep terrain

4.21.10 Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator shall conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility shall be considered that the presence of

drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).

4.21.11 Logs, ditches, road curbs, and other long and horizontal obstacles should be approached and driven over squarely, not at an angle.

4.21.12 When close lateral or overhead clearance is encountered, or when backing up, the driver of the rig shall be guided by another person on the ground.

4.21.13 Loads on the drill rig and truck shall be properly stored while the truck is moving, and the mast shall be in the fully lowered position.

4.22 Loading and Unloading

4.22.1 Consult applicable manufacturer's recommendations for loading and unloading of the equipment.

4.22.2 Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.

4.22.3 Load and unload on level ground.

4.22.4 Use the assistance of someone on the ground as a guide.

4.22.5 Check the brakes on the rig carrier before approaching loading ramps.

4.22.6 Distribute the weight of the rig, carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the height of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.

4.22.7 The rig and tools should be secured to the hauling vehicle with ties, chains, and / or load binders of adequate capacity.

5.0 Records

5.1 All employee training files shall be maintained in accordance with *S3AM-003PR1 SH&E Training*.

5.2 Completed inspections and maintenance inventories shall be maintained the site or project files.

6.0 Attachments

6.1 S3AM-321-ATT1 Core Drilling Machine

6.2 S3AM-321-ATT2 Pre-Drilling, Boring, & Direct-Push Probing Flow Chart

6.3 S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection

6.4 S3AM-321-FM2 Drilling, Boring & Direct-Push Equipment Maintenance Inventory

Americas

Overhead Lines & Obstructions

S3AM-322-PR1

1.0 Purpose and Scope

1.1 Provides the safe work requirements to be observed where overhead obstructions (e.g., cable trays, pipe racks, etc.), overhead utilities, or other lines are present at a work location, including, but not limited to electric power lines, electrical apparatus, or any energized (exposed or insulted) parts, communication wires, or any other overhead wire or cable.

1.2 This procedure applies to all AECOM Americas**-**based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Arc Flash Hazard** – A dangerous condition associated with the possible release of energy caused by and electric arc. Arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury.

2.2 **Electrical Hazard** – A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

2.3 **Minimum Approach Distance (MAD)** – The MAD is the closest distance any employee or any part of the operating equipment is permitted to approach an energized or a grounded object.

2.4 **Qualified Person (Electrical Transmission and Distribution) –** A person trained and knowledgeable in the construction and operation of electrical transmission and distribution equipment or a specific work method, and has been trained to recognize and avoid electrical hazards that might be present with respect to that equipment or work method.

2.5 **Types of Overhead Lines / Obstructions (examples)**:

- Overhead electric power lines
- Structural cable supports
- Guy wires
- Cable television / communication lines
- Cable Trays
- Pipe Racks
- Low Clearance Overpasses

3.0 References

3.1 S3AM-004 PR1 Incident Reporting, Notifications & Investigation

3.2 S3AM-010-PR1 Emergency Response Planning

3.3 S3AM-209-PR1 Risk Assessment & Management

3.4 S3AM-302-PR1 Electrical Safety

3.5 S3AM-303-PR1 Excavation

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **Manager**

- Identify conditions where overhead electric power lines and other overhead obstructions may be present and outline what is required in the SH&E Plan and Task Hazard Assessments. Refer to the *S3AM-209-PR1 Risk Assessment & Management*.
- Confirm electrical and communication lines, and as appropriate other overhead obstructions, are identified on all site and project drawings.
- Coordinate and communicate with overhead electrical line owner or operator to identify and implement appropriate control measures.
    - Provide adequate advance notification to the Overhead Electrical Line Owner / Operator to allow for insulation or isolation and grounding of the line(s) if required.
    - Confirm the Overhead Electrical Line Owner / Operator(s) are fully informed as to when the operations are to begin, end and when any location changes are planned if applicable.
- Confirm Employees are trained as required for the scope of work and associated hazards.
- Coordinate and communicate with subcontractors or employees working around overhead electric power lines and as applicable, other overhead obstructions.
- Confirm the *S3AM-322-FM1 Overhead Electric power lines Acknowledgement* is completed by concurrent operations working around overhead electric power lines on the worksite.

4.1.2 **Safety Health & Environment (SH&E) Manager**

- Assist and support the Manager in planning and responding to concerns regarding the exposure to overhead electric power lines.

4.1.3 **Employees**

- Maintain current training required for the scope of work and associated hazards.
- Inform the Manager of location conditions that may expose risks to overhead electric power lines.
- Comply with established minimum approach distances.

4.2 Training

4.2.1 The Manager shall confirm all Employees are oriented to the SH&E Plan and Task Hazard Assessment (THA) process, in accordance with *S3AM-209-PR1 Risk Assessment & Management*.

4.2.2 Confirm training requirements were met prior to work starting.

-
- Employee orientation shall include the Location Specific Emergency Response Plan.
- Proof of training and orientation shall be documented and retained in the project files.

4.2.3 Managers shall confirm that each Employee has received training required for the scope of work and associated hazards in accordance with *S3AM-003-PR1 SH&E Training*.

4.2.4 Additional training requirements may include, but are not limited to:

- The limitations of an insulating link / device, proximity alarm, and range control (and similar) device, if used.

- Grounding and bonding procedures.
- Client specific requirements

4.3 General Requirements

4.3.1 The AECOM Manager or supervisor and employees shall perform a walk-thru of the work site and / or review of the work area / travel route to identify the overhead electric power lines and any other overhead obstructions that could be impacted by the work. Consider high profile equipment, equipment in transport, swing radius of equipment, potential for shifting loads, etc. AECOM personnel may be accompanied by other applicable personnel (e.g. client representatives, contractors operating concurrently, etc.).

4.3.2 The location or project specific SH&E Plan shall identify all overhead line hazards and provide suitable methods of elimination or control. All involved or affected workers shall review the SH&E Plan to confirm proper communication of the overhead line hazards and awareness of the control measures associated with their work.

4.3.3 Assess applicable factors such as, but not limited to:

- Scope of work (e.g. hoisting materials, excavation, grubbing, etc.).
- Transportation route.
- Hoisting, excavating, or other equipment to be operated.
- Height, placement, and reach of equipment.
- Equipment or material loading / unloading.
- Location(s) of electric power lines, communication lines, guy wires, etc.
- Worker training and experience.
- Soil or ground condition and environmental conditions.
- Interruptions to electrical services.
- Hazard to public.
- Use of ladders.
- Pipe and other conducting materials.
- Notification of electric utility owner.
- Changing conditions.
- Communication of all hazards to all workers including contractors, sub-contractors, and concurrent operations.

4.3.4 Task Hazards Assessments (THAs) shall be completed to record the hazards and control measures specific to the task, including those related to overhead line and obstructions hazards, prior to undertaking assigned tasks. THAs shall be reviewed and signed by all workers involved in the specific task.

4.3.5 Should adverse weather conditions cause the work associated with overhead lines to be unsafe, the activities shall be discontinued.

4.3.6 Managers or designated employees shall formally notify all concurrent operations, or any others who may not have had reason to review and sign the related SH&E Plan or THAs, of work that is to be done in the vicinity of overhead lines at distances less than 50 feet (15.25 meters), and for non-electrical obstructions, at distances less than 10 feet (3.05 meters) if appropriate to the obstruction’s potential hazards, and obtain the operator's assistance in protecting workers involved.

- Formal notification may be accomplished through a review of the SH&E Plan or THAs by the concurrent operator and associated personnel, as evidenced by signing the respective document's acknowledgement.
- Alternately, the concurrent operations may acknowledge having reviewed AECOM's procedures with a separate acknowledgment form. *S3AM-322-FM1 Overhead Electric Power Lines Acknowledgement Form* or equivalent may be used.
- Prior to equipment operation within 10 feet (3.05 meters) of non-electrical obstructions, as appropriate to potential hazards associated with the obstruction, the Owner/Operator should be contacted to obtain specific details regarding the obstruction such as piping or tray contents,

4.3.7 Overhead lines are presumed to be energized unless the Overhead Electrical Line Owner / Operator confirms that the overhead line has been, and continues to be de-energized and visibly grounded at the worksite.

4.3.8 Overhead lines are presumed to be uninsulated unless the Overhead Electrical Line Owner / Operator or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution confirms that a line is insulated.

4.3.9 Confirm accurate measurement of load heights, maximum equipment radius and height or reach of any other equipment that could potentially encroach on the safe limit of approach for the overhead electrical line,guy wires, or other applicable overhead obstructions.

- The height of all applicable overhead lines and obstructions that pose contact or encroachment potential shall be determined prior to work commencing.
- The height of electric power lines may only be determined by the client, utility company professional, or by using an approved electronic measuring device.
- Awareness shall be maintained for any elements that could affect clearance (e.g. snow pack, ice or snow weighing down lines, excessive heat causing sag, etc.).
- Caution shall be exercised when working or travelling near overhead lines having long spans, since they tend to be more prone to lateral swing in response to the wind and can present a contact hazard.
- All low hanging communication lines in close proximity to energized lines shall be clearly identified as *Encroaching on Energized Lines.*

4.3.10 Managers shall contact the overhead owner/operator (i.e. local utility company) if work is to be done or before equipment is operated within 50 feet (15.25 meters) of an energized overhead line, to determine the voltage of the overhead line and establish the appropriate MAD.

- All inquiries regarding electric utilities shall be made in writing and a written confirmation of the outage / isolation shall be received by the appropriate AECOM Manager prior to the start of the task that may impact the utility.

4.3.11 Until the voltage of the overhead electrical line is known and the MAD established, an exclusion zone shall be created at ground level beneath and 50 feet (15 meters) perpendicular to the overhead electric power lines on each side.

- The exclusion zone shall be demarcated with visual indicators (e.g., signage, flagging, paint, cones). No equipment shall enter the exclusion zone without approval from AECOM management.
- Unqualified employees shall maintain a safe clearance distance in accordance with the established MAD when working in an elevated position near energized overhead lines. For additional information associated with Qualified Employees refer to *S3AM-302-PR1 Electrical Safety*.

4.3.12 The Minimum Approach Distance (MAD) as it relates to Voltage varies from jurisdiction to jurisdiction. The MAD or the regulatory minimum distance requirements, whichever is more stringent, shall be maintained. The below chart shows the Phase-to-Phase voltage rating voltages in kilovolts and the MADs applicable to all AECOM operations:

Minimum Approach Distances (MAD)

Voltage Range (Kilovolts) (Phase-to-Phase)	Minimum Approach Distance (MAD) in Feet (Meters)
Personnel shall allow for equipment movement and electrical line swaying when establishing a M.A.D.	
0 – 50 KV	10 (3)
Over 50 – 200 KV	15 (5)
Over 200 – 350 KV	20 (6)
Over 350 – 500 KV	25 (8)
Over 500 – 750 KV	35 (11)
Over 750 – 1,000 KV	45 (14)
Note: This requirement shall apply except where client, local, or governmental regulations are more stringent.	

Source: American National Standards Institute, Publication B30.5.

4.3.13 An appropriate distance shall be kept between equipment, its occupants, their tools and energized overhead lines, electrical apparatus, or any energized parts.

4.3.14 These minimum approach distances do not apply to a load, equipment, or building that is transported under energized overhead power lines if the total height, including equipment transporting it, is less than 13.5 feet (4.15 meters).

- If the travelling equipment, including load, is over 4.15m (13.62ft) a transportation permit shall be acquired from the appropriate jurisdiction to travel on any public road or highway.
    - Consult local jurisdiction as some US states may use heights of up to 4.45m (14.6ft).
    - Notification of appropriate utility companies may be required in conjunction with the transportation permit. Jurisdictional requirements shall be verified prior to transport.
    - Route shall be checked for clearance of overhead electrical and communication lines prior to transport.
    - A designated signaler will be utilized when the height of the equipment, buildings, tractor / trailers or any other transport equipment travelling under an overhead electrical line is greater than 4.15m (13.62ft).

4.3.15 Employees shall not place earth or other material under or beside an electrical overhead line if doing so reduces the safe clearance to less than 50 feet (15.25 meters) or, if appropriate to potential hazards associated with other types of overhead obstruction, less than 10 feet (3.05 meters). To maintain a safe distance:

- Install warning devices and signs (hang a sign from and mark all guy wires to warn traffic of low clearance; provide warning signage for all overhead services).
- Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.
- Position signs or other devices to determine the “Danger Zone”.

- Inform all job site personnel of the danger zone and the safe distances required.
- Beware of atmospheric conditions, such as temperature, humidity, and wind that may dictate more stringent safety procedures.

4.3.16 If employees are to climb or perform work on poles or towers, the structures shall be confirmed as capable of withstanding the weight and activity without failure.

4.3.17 If holes are dug for poles or foundations for structures, appropriate measures shall be taken to prevent inadvertent entry by personnel or equipment. Refer to *S3AM-303-PR1 Excavation*.

4.3.18 Operation of heavy equipment and cranes in areas with overhead lines represents a significant arc flash and electrical hazard to all personnel on the job site.

- Accidental contact with an energized overhead line or arcing between a high power line and grounded equipment, can cause harm to nearby equipment operators or ground personnel and damage to power transmission systems and / or operating equipment.
- Equipment will be repositioned and blocked so that no part, including cables, can come within the established minimum clearances.

4.3.19 Gravel trucks, cranes, boom trucks, etc. shall retract, stow and lower boxes, outriggers, booms, etc. to the travel position prior to entering municipal and client owned roads (e.g. leaving plant sites, work over rig sites, battery sites, and storage yards) and any time travel may put the equipment within the MAD of an electrical line.

4.3.20 When a signal person is required, the individual shall wear reflective striping (coveralls or vest) and carry an air horn or other appropriate means of emergency communication.

4.3.21 The signal person shall be aware of the potential electrical line hazards, be verified as competent by their supervisor and not have any other duties while acting as the signal person.

4.3.22 The signal person shall remain outside the MAD and in a position that allows for monitoring of equipment or loads to prevent encroachment on the MAD.

4.3.23 Signs, pylons, high visibility tape and / or signalers shall not be removed until the last piece of AECOM equipment has traveled under the overhead electrical line.

4.4 Minimum Approach Distance (MAD) Reduction

4.4.1 Where any work task will not allow the MAD to be maintained, an alternate means of protection shall be implemented by the Manager and approved by the SH&E Manager. In order of preference, acceptable procedures are:

- De-energize the overhead line(s) / lockout by local utility authorities; or
- Implement alternative procedures as identified by the Overhead Electrical Line Owner / Operator or a registered professional engineer.

4.4.2 De-energize Overhead Lines

- Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site overhead lines are often under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the Overhead Electrical Line Owner / Operator. De-energizing of an overhead line often requires advance coordination with the Overhead Electrical Line Owner / Operator. At least one week advance notice should be provided.
- Managers shall confirm with the utility Overhead Electrical Line Owner / Operator that the overhead line has been de-energized and visibly grounded at the job site.

4.4.3 Alternative Procedures

- Managers may implement alternative procedures to prevent arc flash and electrical contact. These procedures shall be identified by the Overhead Electrical Line Owner / Operator or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution.
- A planning meeting with the Manager, SH&E Manager and the Overhead Electrical Line Owner / Operator (or registered Professional Engineer) shall be held to determine the most effective alternative procedures.
- Alternative procedures shall meet all client, local and governmental regulatory requirements.
- The work will be conducted by qualified and competent individuals, following the alternative written safe work procedures. All others are restricted from entering the MAD.
- Insulating Barriers shall be rated for the voltage line being guarded. These barriers may not be part of or attached to the equipment. The MAD shall only be reduced within the designed working dimensions of the insulating barrier. This determination shall be made by a Qualified Person in accordance with local or governmental requirements for work practices near energized equipment.
- Consult *S3AM-302-PR1 Electrical Safety* procedures to properly ground equipment and for limitations of grounding.
- Dedicated Line Spotters shall be trained to enable them to effectively perform their task, including training on the applicable local and governmental regulations.
- No work that encroaches on an energized power line will be completed outside of daylight hours.

4.5 Additional Safety Measures.

4.5.1 When equipment shall repeatedly travel beneath electric power lines, a route shall be plainly marked and “rider poles” of non-conductive material shall be erected on each side to confirm equipment structures are lowered into a safe position.

- 20” X 28” (50.8cm X 71.12cm) Danger Overhead Power Lines signs, which are highly visible, shall be erected at a height of 1.8 meters (6ft) on each side of the electrical line. A combination of pylons and high visibility tape shall be placed underneath the electrical line.
- These signs shall be in plain view of equipment traveling in either direction, but no closer than the MAD.
- If physical guards (i.e. goal posts, rider poles) are used, the guards shall be of non-conductive material and consist of a pole on each side of the approach connected by a rope.
- The poles will be placed at the MAD from and on each side of the electrical line. The ropes will be set at a height, which will maintain the MAD from the electrical line.

4.5.2 Watch for uneven ground that may cause vehicles and equipment to weave, bob, or bounce.

4.5.3 The following additional safety measures shall be implemented as needed when working around energized power lines:

- Provide equipment with proximity warning devices. These provide an audible alarm if any part of the equipment gets too close to a line.
- Install ground safety stops. These prevent vehicles from accidentally entering hazardous areas.
- Equip cranes with a boom-cage guard. This prevents the boom from becoming energized if an electrical line is contacted.

- Utilize insulated links and polypropylene tag lines. These prevent the transmission of electricity to loads or tag line handlers if an electrical line is contacted.

  NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures outlined in this document.

4.6 Emergency Planning

4.6.1 Managers shall complete a location specific emergency response plan as part of their location or project specific SH&E Plan for all operations during which equipment is operated within 50 feet (15.25 meters) of an energized overhead electrical line or conductor. Refer to *S3AM-010-PR1 Emergency Response Planning*. This plan shall identify the following information:

- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The potentially energized zone around the equipment.
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- The means to de-energize the electrical line or live conductor.
- The contact information for the utility Overhead Electrical Line Owner / Operator and emergency services.

4.6.2 In the event of an incident, the Employee shall report it in accordance with *S3AM-004 PR1 Incident Reporting, Notifications & Investigation.*

4.6.3 All damaged utilities shall be repaired by a qualified and / or licensed professional.

5.0 Records

5.1 Retain the Overhead Electric power lines Acknowledgement forms and any document related to requests of and confirmation from the Overhead Electrical Line Owner / Operator in the project files. Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

6.0 Attachments

6.1 S3AM-322-FM1 Overhead Electric Power Lines Acknowledgement Form

Americas

Underground Utilities

S3AM-331-PR1

1.0 Purpose and Scope

1.1 Provides procedures designed to help prevent injuries to personnel working on the location and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with encountering underground utilities, subsurface installations, and potential overhead hazards.

1.2 Provides the minimum requirements to be followed for underground work (e.g., excavations, drilling, boring, and probing work) to ensure that underground installations, and subsurface structures, are identified properly before work commences.

1.3 This procedure applies to all Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling and communications, etc.

2.2 **Clearance** – includes the following:

- The positive locating of underground utilities or subsurface installations in or near the work area.
- A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

2.3 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.4 **Hand Clearance / Tolerance Zone –** The area on either side of the locate marks of a utility that shall be maintained in order to expose the utility through the use of non-destructive ground disturbance techniques acceptable to the owner of the buried utility and applicable jurisdictional requirements. Visual exposure is required before mechanical excavation equipment may be used.

2.5 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench or depression in an earth surface formed by earth removal.

2.6 **Non-Destructive Ground Disturbance Technique –** A safe and acceptable excavation method that is used to visually expose an underground utility without causing damage. Non-destructive ground disturbance techniques may include, but are not limited to:

- Hand digging.
- Use of non-conductive tools.
- Hydro-vacuum.

2.7 **Subsurface Installation –** Examples: Subterranean tunnels, underground parking garages and other structures beneath the surface.

2.8 **Utility Strikes –** Unplanned contact with utilities resulting in damage to the utility or its protective coating.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-303-PR1 Excavation

3.3 S3AM-321-PR1 Drilling, Boring & Direct-Push Probing

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Administer this procedure and the development of the SH&E Plan.
- Confirm the appropriate equipment and materials are available to conduct the underground utility and/or subsurface installation clearance.
- Confirm all employees involved and affected by the task review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing
- Authorize work to proceed using the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist*.
- Confirm that employees conducting underground utilities and subsurface clearance processes possess all required training, registrations or certifications.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

4.1.2 **Safety, Health & Environment (SH&E) Manager**

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the SH&E Plan to confirm compliance with jurisdictional regulations. Provide technical guidance as needed when a variance is pursued related to this procedure.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g. ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training*.
- Review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and/or repairs.

4.2 Training

4.2.1 All on-site employees involved with the underground utility and subsurface identification and associated clearance process shall be trained, at a minimum, in these procedures.

4.2.2 Employees shall complete all required training associated with their tasks in accordance with the SH&E Training Matrix and any training assessments developed at the business group.

- Refer to *S3AM-003-PR1 SH&E Training.*
- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.

4.2.3 As applicable, employees shall receive client-required training.

4.3 Planning

4.3.1 Health and Safety Plan – At a minimum, a SH&E Plan and task hazard assessments (THAs) shall be prepared prior to any underground utilities and subsurface installations clearance activities.

- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- Employees shall comply with all SH&E Plan requirements.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 *S3AM-331-ATT2 Underground Utilities & Subsurface Installation Clearance Flow Chart* provides a summary of the key requirements addressed in this procedure.

4.3.3 Underground utilities and subsurface installations shall be investigated as being present, including the following, but not limited to:

- Steam, gas and electric.
- Sewer and water.
- Subterranean tunnels.
- Fibre optics (note: routine geophysical surveys will not identify fibre optic cables).
- Traffic control cables.

4.3.4 Location of underground utilities and subsurface installations will be confirmed by cross-referencing available information:

- Maps, as-built drawings and issued for construction (IFC) drawings.
- Plot plans, permits, crossing/encroachment agreements.
- One-Call information, locator and provided surveys.
- Private utility information, locator and provided surveys (e.g. ground penetrating radar (GPR), electromagnetic, etc.).
- Owner supplied documentation.
- Site walks.

4.3.5 As applicable, emergency shut-off locations of utilities shall be verified before work activities commence.

4.3.6 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the minimum search zone dimensions and appropriate clearance distances.

4.3.7 As necessary and if possible, adjust locations of excavations or intrusive subsurface work away from subsurface utilities and installations

4.3.8 Prior to any excavation or intrusive subsurface work, the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* shall be completed. The form shall be reviewed and signed by the Manager.

- If the answer to any question in Part 1 of the checklist is “No” or “N/A”, no ground disturbance may take place without review by the Manager, in consultation with SH&E Manager, of the circumstances related to the particular item. The Manager shall initial beside each “No” or “N/A” item to indicate review and authorization.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, utility company, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 All access agreements will be obtained and adhered to.

4.5 Locating Underground Utilities and Subsurface Installations

4.5.1 Utilize the appropriate call/click-before-you-dig provider. Refer to *S3AM-331-ATT1 One-Call System*.

4.5.2 Federal/State/Provincial/Territorial and other “One Call” providers shall be contacted at least two working days and no more than ten working days prior to commencing the ground disturbance. Jurisdictional requirements shall be consulted to verify the appropriate advance notice. (e.g. 24 hours, two full working days, three to ten business days, etc.).

4.5.3 If the location of proposed excavation or intrusive subsurface work cannot be clearly and adequately identified, the route and/or area of the proposed ground disturbance shall be identified using white flags, paint or stakes prior to the arrival of the locator. Consult jurisdictional requirements as white-lining may be a mandatory requirement on all ground disturbances.

4.5.4 One Call providers shall appropriately identify and mark the subsurface utilities or installations, or otherwise provide written notification they do not have any facilities near the proposed subsurface/intrusive locations.

4.5.5 Confirm all circuits were on during subsurface checks if the checks were for identifying energized lines (e.g. circuits on timers or light sensing switches).

4.5.6 Areas that have a high density of sub-surface facilities may require a secondary locate by another independent locator to verify locations identified by the first locator.

4.6 Private Utility Locating

4.6.1 One Call services may not be available in various non-urban locations. Private utility locating companies shall be utilized to identify and located any underground utilities or subsurface installations.

4.6.2 Be aware urban areas (e.g. city or town) may have subsurface installations (e.g. underground garages) and utilities (e.g. public water, sewer, and gas pipelines) that are not covered by one-call systems.

- These subsurface installations and utilities require additional investigation and diligence beyond the one-call system.
- Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.

4.6.3 In urban areas, private utility locating companies shall be called to identify and locate, through geophysical surveys and other means, the presence of private utilities installed by the property owner (e.g. irrigation systems) and to verify the presence of public utilities on the properties.

- Hand clearance / tolerance zones shall be observed in urban areas and utilities exposed through the use of non-destructive techniques in accordance with requirements of the applicable jurisdiction and utility owner.

4.6.4 Observance of hand clearance / tolerance zones and utility exposure using non-destructive techniques is also recommended for non-urban areas and may be required by the applicable jurisdiction.

4.6.5 Warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill may be evidence of the presence of subsurface installations and utilities.

4.7 Surface Markings

4.7.1 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines from the One-Call System (refer to S3AM-331-ATT1), guidance contained in this procedure or as contract-specified.

4.7.2 Color-coded surface marks (paints or similar coatings) shall be used to indicate the type, location, and route of buried installations. Additionally, to increase visibility, color-coded vertical markers (temporary stakes or flags) shall supplement surface marks.

4.7.3 All marks and markers shall indicate the name, initials, or logo of the company that owns or operates the installation and the width of the installation if it is greater than 2 inches.

4.7.4 If the surface over the buried installation is to be removed, supplemental offset marking shall be used. Offset markings shall be on a uniform alignment and shall clearly indicate that the actual installation is a specific distance away.

4.7.5 Locate marks shall be re-verified as per jurisdictional requirements or no later than 14 days after the previous locate was completed, whichever interval is shorter. These locate time intervals shall be maintained for the duration of the ground disturbance.

- If the work is interrupted during the determined lifespan or work does not commence during the applicable lifespan, a new locate shall be performed.
- Jurisdictional provisions may allow for an extension to the lifespan of the locate marks, however certain conditions may need to be met. (e.g. activities uninterrupted)
- If locate marks are moved or destroyed the location of the buried facilities shall be re-established.

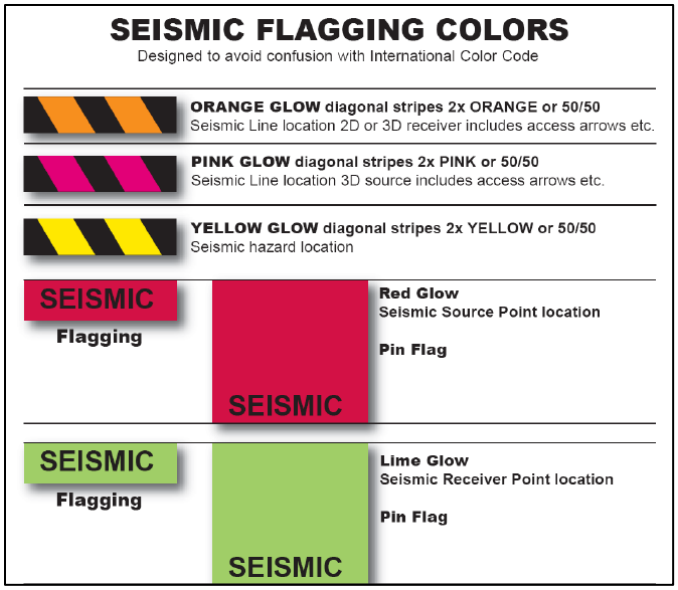
4.8 Uniform Color Coding

4.8.1 The colors and corresponding installation type are as follows unless otherwise contract-specified:

AMERICAN PUBLIC WORKS ASSOCIATION – APWA
Color Coding for Marking of Buried Facilities

White	Proposed Ground Disturbance Area
Pink	Temporary Survey Markings
Red	Electric Power Lines, Cables, Conduit and Lighting Cables
Yellow	Gas, Oil, Steam, Petroleum Lines or Gaseous Materials
Orange	Conduit, Cable, Communication, Alarm or Signal Lines
Blue	Potable Water
Green	Sewer, Storm Sewer and Drain Lines
Purple	Reclaimed Water, Irrigation and Slurry Lines (non-potable)

Canadian Association of Geophysical Contractors



4.9 Identification and Mapping of Utility and Subsurface Structures

4.9.1 The locations of subsurface utilities and subsurface installations shall be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.*

4.9.2 Documentation of utility and subsurface installation identification (calling one call, responses from utilities) along with the scaled site plan shall be available on the worksite at all times of intrusive activities.

4.10 Site Walk

4.10.1 A site walk shall be conducted by the AECOM Manager and any other appropriate personnel with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities, overhead obstructions, and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.

- Walk the area at least 50 feet (15.2 meters) from perimeter of the site to observe physical hazards.
- Walk the area of at least 50 feet (15.2 meters) radius from each proposed subsurface intrusion location.
- If possible, particularly at urban and industrial sites, the client/property owner or an individual knowledgeable about the site and site utilities will attend the site walk.
- Add discovered items/issues to map for use in location confirmation.

4.10.2 The Site Walk further supplements the Identification and Mapping of Utility and Subsurface Structures procedure. Site Walks should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures as visual verification of the hazards. Examples include:

- Proposed location(s) does not lie on a line connecting two similar manhole covers (e.g. sanitary sewer or storm drain).
- Proposed subsurface location(s) has not subsided, been excavated and patched, nor gives the appearance it may be covering a former trench (e.g. linear cracks, sagging curbs, linear re-pavements, etc.).
- Proposed subsurface location(s) does not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas.

4.11 Proposed Subsurface Investigation Locations

4.11.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.

4.11.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

4.12 Utility Clearance Investigation Location Confirmation

4.12.1 As applicable, all client on-site safety procedures shall be understood and adhered to.

4.12.2 Hand exposure or non-destructive ground disturbance techniques to expose an underground utility or subsurface installation are necessary to accurately determine size, location and alignment prior to mechanical excavation or intrusive subsurface work in the vicinity of that utility or installation.

4.12.3 Non-destructive ground disturbance techniques shall be acceptable to the owner of the buried utility (i.e. hydro-vacuum temperature or pressure).

4.12.4 Hydro-vacuum or air-knife require proper grounding equipment at sites where the subsurface may contain flammable gases, liquids, or vapors

4.12.5 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the distance of the hand exposure zone, and what requirements, when met, may allow mechanical excavation within these zones.

4.12.6 At a minimum, all underground utilities and subsurface installations within a 5 feet (1.5 meter) radius of the work site shall be identified and physically located (seen) before use of mechanical excavation equipment is permitted. Jurisdictional, client, land owner and utility owner requirements shall be consulted as the required hand exposure radius may be larger.

4.12.7 In urban areas, proposed subsurface locations will be cleared by hand / non-destructive technique to 5 feet (1.5 meters) (soil borings and wells) or 12 inches (30 centimeters) (soil gas sampling probes) using non-mechanical methods.

- In non-urban areas, clearing by hand / non-destructive technique should be conducted if possible and shall be conducted as required by the given jurisdiction.
- Hand / non-destructive technique clearance should be extended if locations of deep utilities and structures are not known.
- Hand exposure or non-destructive ground disturbance techniques should extend a minimum of 24 inches (60 centimeters) below the intended ground disturbance depth to minimize the hazard of mechanical equipment contact with any utility or installation.

4.12.8 Mechanical equipment and attachment dimensions shall be considered when establishing the zone in which all underground utilities and subsurface installations are physically located (seen) prior to the use of that equipment. The radius may require expanding to maintain safe distances when using large equipment.

4.13 Utility Strikes

4.13.1 Utility strikes shall be reported in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*.

4.13.2 All damaged utilities shall be repaired by a qualified and/or licensed professional.

5.0 Records

5.1 Retain completed *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* and documents related the clearance process (e.g. Utility Owner communication, etc.) in the site or project files.

5.2 Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training*.

6.0 Attachments

6.1 S3AM-331-ATT1 One-Call System

6.2 S3AM-331-ATT2 Underground Utilities & Subsurface Installation Flow Chart

6.3 S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist

Americas

Hot Work

S3AM-332-PR1

1.0 Purpose and Scope

1.1 Establishes the minimum requirements for welding, cutting, and other hot work activities. Other AECOM activities may also trigger the need for a Hot Work Permit and procedure depending upon the associated hazards (e.g. internal combustion engine or electrical equipment in flammable atmospheres).

1.2 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.

1.3 AECOM's clients may have hot work related procedures. Provided the client's procedures meet or exceed those of AECOM, the client procedures may be used in place of AECOM's procedure. AECOM employees shall be familiar with client requirements for welding, cutting and other hot work activities and coordinate such activities with the client representative.

2.0 Terms and Definitions

2.1 **Authorized Air Monitor** – Worker(s) who have been designated to monitor the presence of flammable gas in the area where hot work is planned using appropriate air-monitoring equipment.

2.2 **Class I Location – Gases or Vapors** – Hazardous area in which flammable gases or vapors may be present in sufficient quantities to be explosive or ignitable. Local regulations should be reviewed to ensure all conditions are met prior to entering work zone.

2.3 **Class II Location – Combustible Dust** – Hazardous area in which combustible dust under normal operating conditions is present at concentrations sufficient to produce explosive or ignitable mixtures. Local regulations should be reviewed to ensure all conditions are met prior to entering work zone.

2.4 **Class III Location – Fibers** – Hazardous area in which fibers or materials capable of producing combustible fibers are present in concentrations sufficient to produce ignitable mixtures. Local regulations should be reviewed to ensure all conditions are met prior to entering work zone.

2.5 **Combustible Material –** Any material that may ignite when introduced to an ignition source (e.g., wood, paper, cardboard and plastic).

2.6 **Designated Area** – A specific area designed or approved for hot work, such as a maintenance shop, a detached outside location that is of non-combustible or fire-resistive construction, or an outdoor location (many greenfield construction sites) essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. A Hot Work Permit is not required in a Designated Area.

2.7 **Fire Watch** – Worker(s) designated to monitoring hot work and the surrounding area for incipient fires and changing conditions.

2.8 **Hot Work –** A work activity that by the nature of the operation (e.g., grinding, burning, thermo cutting/welding, brazing, etc.) creates an open source of ignition (primary source of ignition or secondary source of ignition) or that could produce temperatures high enough to cause the ignition of flammable gases and combustible materials.

2.9 **Hot Work Control Areas** – Fire-hazardous areas such as cable-spreading rooms, cable trays, conveyor galleries, rubber-lined piping equipment and structures, potentially explosive atmospheres, and similar hazardous hot work areas identified by project safety personnel.

2.10 **Hot Work Operator –** Worker(s) who will handle the hot work equipment and conduct the hot work processes.

2.11 **Hot Work Permit** – Document issued prior to the start of hot work, which is used to verify the presence of appropriate fire prevention and protection measures.

2.12 **Intrinsically Safe** – A form of protection based on the restriction of electrical energy within the system, equipment or tool to a level below that which may cause ignition by either sparking or heating effects. Most electronic communication devices, flashlights, cameras and power tools are not rated as intrinsically safe.

2.13 **Lower Explosive Limit (LEL) –** The minimum concentration of a particular flammable or combustible gas or vapor necessary to support its combustion in air. The safety factor for hot work is 10 percent of the LEL as measured using a calibrated combustible gas detector. Note: At 10 percent of the LEL, the atmosphere may be considered immediately dangerous to life and health (IDLH). In some locations, the safety factor for hot work is 5 percent of the LEL.

2.14 **Primary Source Ignition (PSI) Hot Work** – Any work with equipment and tools that use high-energy sources (open flames, electric arcs or incandescent spark) that may ignite flammable or combustible atmospheres, solid materials or liquids when used in a normal manner. PSI hot work is often referred to as 'naked flame' hot work. Examples of PSI hot work include, but are not limited to, the following:

- Welding and burning,
- Grinding, and
- Torch cutting and soldering.

2.15 **Secondary Source Ignition (SSI) Hot Work –** Any work with equipment and tools that may create low-energy sparks and ignite a flammable or combustible atmosphere when used in a normal manner or due to errors or malfunction. SSI hot work is also referred to as 'spark potential' hot work. Examples of SSI hot work include, but are not limited to, the following:

- Sandblasting;
- Using electrical or electronic equipment that is not intrinsically safe or explosion proof (e.g., most electronic communication devices, flashlight, etc.);
- Using spark-ignition engines (including vehicles) in a Class I area (e.g., vehicle entry into a tank dike);
- Using a rotating steel brush;
- Electrical isolation testing; and
- Producing a friction spark, typically from a rusty surface.

2.16 **Sources of ignition** – In locations where flammable vapors may be present, precautions shall be taken to prevent ignition by eliminating or controlling ignition sources. These may include open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, and mechanical), spontaneous ignition, chemical and physical-chemical reactions, and radiant heat.

3.0 References

3.1	Q2-312-PR1	Monitoring and Measuring Equipment Procedure
3.2	S3AM-002-PR1	Stop Work Authority
3.3	S3AM-003-PR1	SH&E Training
3.4	S3AM-011-PR1	Fire Protection
3.5	S3AM-012-PR1	First Aid
3.6	S3AM-202-PR1	Competent Person Designation
3.7	S3AM-208-PR1	Personal Protective Equipment
3.8	S3AM-218-PR1	Permit to Work
3.9	S3AM-301-PR1	Confined Spaces

3.10 S3AM-325-PR1 Lockout Tagout

3.11 S3AM-123-PR1 Respiratory Protection

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager/Supervisor**

- Administer this procedure and the development of the project SH&E Plan.
- Confirm AECOM Employees receive the specified level of protection as to project welding, cutting and burning activities.
- Confirm a Hot Work Permit is issued and has been signed by all parties prior to starting hot work and all control measures are maintained during hot work.
- Confirm compliance with this procedure during all hot work operations.
- Confirm all Employees performing hot work and in the vicinity of hot work are appropriately trained to the applicable tasks and associated hazards.

4.1.2 **Hot Work Operator**

- Maintain appropriate training to the task(s) to be undertaken. Know and apply applicable company and regulatory policies and procedures related to hot work operations.
- Participate in the inspection of welding and burning equipment and work areas.
- Participate in the completion of and sign the Hot Work Permit to acknowledge his or her understanding of the conditions documented on the permit.
- Comply with the conditions of the issued Hot Work Permit.
- Safely handle hot work equipment and processes.
- Stop hot work operations immediately if unsafe conditions develop and notify the Manager or Supervisor immediately for evaluation and appropriate action.

4.1.3 **Authorized Air Monitor**

- Responsible for operating air-monitoring equipment to monitor the presence of flammable gas in the area where hot work is planned.
- Participate in the completion of and sign the Hot Work Permit to acknowledge his or her understanding of the conditions documented on the permit. Perform the following duties:
    - Verify that the air monitoring device to be used is calibrated according to the manufacturer's instructions and that calibration information is documented in Section B – Atmospheric Monitoring of *S3AM-332-FM1 Hot Work Permit* or equivalent.
    - Perform initial air monitoring of the hot work area for the presence of flammable gas.
    - Perform continuous air monitoring for the presence of flammable gas between the hot work and potential vapor sources.
    - Verify that a LEL Mitigation Plan is developed and documented in Section C – LEL Mitigation Plan of *S3AM-332-FM1 Hot Work Permit* or equivalent if initial or continuous air monitoring detects the presence of flammable gas (LEL is greater than 0 percent).
    - Verify that the LEL Mitigation Plan is implemented and flammability is controlled to less than 10 percent (or 5% in certain jurisdictions) of the LEL before allowing hot work to proceed.

- Stop all hot work if any air monitoring reading is greater than 10 percent (or 5% in certain jurisdictions) of the LEL.

- The Authorized Air Monitor may also be the Fire Watch, if a Fire Watch is required per Section D – Fire Watch of *S3AM-332-FM1 Hot Work Permit*.
- The Authorized Air Monitor shall not be a Hot Work Operator during PSI hot work but may be a Hot Work Operator during SSI Class 1 hot work.
- NOTE: Refer to Air Monitoring (Class 1 Areas) of this procedure for additional information regarding the Authorized Air Monitor and air monitoring requirements.

4.1.4 **Fire Watch**

- Responsible for monitoring hot work and the surrounding area for incipient fires and changing conditions.
- Participate in the completion of and sign the Hot Work Permit to acknowledge his or her understanding of the conditions documented on the permit.
- The Fire Watch may also be the Authorized Air Monitor. Refer to Section D – Fire Watch of *S3AM-332-FM1 Hot Work Permit*
- Perform no duties other than those required of the Fire Watch, and if applicable, the Authorized Air Monitor.
- Perform no other duties apart from fire watch duties (and Authorized Air Monitor if applicable), including, but not limited to the following duties:
  - Understand the location, nature and hazards of the hot work to be performed.
  - Survey the area to verify that the necessary fire protection equipment is in place and ready for use and be trained in its use.
  - Confirm that safe conditions are maintained during hot work operations.
  - Remain within communication range of the person(s) performing the hot work and maintain a line of sight with the hot work.
  - Do not leave the area for any reason without a replacement or stopping the hot work.
  - Watch for fires in all areas exposed to hot work and communicate to Hot Work Operators to cease all hot work if a fire occurs.
  - Try to extinguish a fire only when the fire is obviously within the capacity of the equipment available.
  - Sound the alarm (e.g., air horn) and implement evacuation procedures immediately if determined a fire is not within the capacity of the available extinguishing equipment.
  - In the absence of fire or evacuation, remain in the hot work area at least 30 minutes after the hot work has ceased to detect and extinguish possible smoldering fires.
- The Fire Watch shall not be a Hot Work Operator and shall have no other duties other than Fire Watch, and if applicable, the Authorized Air Monitor, during the hot work activities and for a period of at least 30 minutes afterwards.

4.2 General Requirements

4.2.1 As applicable, alternative methods to hot work shall be employed when fire-hazardous areas (e.g., cable-spreading rooms, cable trays, conveyor galleries, rubber-lined piping equipment and structures, etc.), potentially explosive atmospheres, and similar hazardous areas may be encountered.

4.2.2 At a minimum, a SH&E Plan and a task hazard assessment (THA) shall be prepared prior to any hot work activities.

- The SH&E Plan will identify the hot work activities and address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- The SH&E Plan will provide the measures required to eliminate or otherwise control the hazards associated with the hot work.
- The Hot Work Permit Applicability decision flow chart contained in the procedure shall be used to identify air monitor, fire watch and hot work permit requirements. Refer also to *S3AM-218-PR1 Permit to Work* for additional guidance related to Safe Work Permits.
- All SH&E Plan requirements will be followed by AECOM personnel.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected. Refer to *S3AM-010-PR1 Emergency Response Planning*.

4.2.3 Before any hot work is performed, and as part of developing the SH&E Plan, the area shall be evaluated for flammables or combustibles by the Supervisor responsible for authorizing hot work. Examples may include, but are not limited to:

- Identifying flooring materials.
- Determining if any materials such as paper, straw or wood shavings are within 50 feet (15.24 meters) of the proposed hot work.
- Verifying the contents of any containers or tanks within 50 feet (15.24 meters) of the proposed hot work.
- Testing to determine if flammable atmospheres exist in the proposed hot work area.
- Testing the atmosphere in vessels that may be welded or cut to verify adequate cleaning or purging.
- Assessing the dryness of grass or trees in the hot work area and vicinity.

4.2.4 Where hot work permits are used, all hot work activities shall be controlled and isolated from flammables and combustibles.

4.2.5 Performing hot work in classified and non-classified areas may be considered a hazardous activity, and a Hot Work Permit may be required. Refer to *S3AM-332-FM1 Hot Work Permit*.

4.2.6 The Hot Work Permit has five purposes:

- To serve as written permission to do the work;
- To provide a minimum safety checklist;
- To show the steps necessary to provide a safe job site for conducting hot work;
- To alert operating personnel to the work in progress; and
- To provide a record of safety steps taken for contract work.

4.2.7 The client may also have requirements for whether a hot work permit is required.

4.2.8 Individuals, who have the technical and procedural competencies as defined by AECOM as well as their roles within the Hot Work activity, shall provide input to the permit as necessary to address all hazards and permit conditions related to the hot work.

4.2.9 Engineering controls shall be implemented to control hot work hazards to the extent feasible.

- Non-intrinsically safe equipment is prohibited from all locations that may contain a flammable

or combustible atmosphere.

- Positive air shut-off valves on internal combustion engines may be required to prevent ignition of flammable or combustible atmospheres.
- When possible, objects to be welded, cut, or heated shall be moved to a designated safe location. If this is not possible, all movable combustibles in the workspace shall be taken away to a safe place.
- If the object to be welded, cut, or heated cannot be moved and all combustibles cannot be removed (e.g., equipment, walls, floors, etc.), positive means shall be taken to confine the heat, sparks, and slag to protect the immovable combustibles.
- No welding, cutting, or heating shall be done where application of flammable paint, presence of other flammable compounds, or heavy dust concentrations create a possible hazard.
- Wherever there are openings or cracks in the flooring that cannot be closed, precautions shall be taken so no sparks or slag will drop through the floor. The same precautions shall be taken in the presence of cracks or holes in walls, open doorways, and open or broken windows.
- Provide metal buckets for disposal of electrode stubs.
- When feasible, ventilation shall be in place to control atmospheric hazards.

4.2.10 Identify the type of metal to be worked on and protective coatings that have been applied. Where coatings are flammable or toxic, the coating shall be stripped a minimum of four inches (10 centimeters) from the areas of heat application.

- Before welding, cutting, or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Refer to *S3AM-202-PR1 Competent Person*.

4.2.11 Position welding screens or shields to protect workers and passers-by from welding arc rays.

4.2.12 All hot work equipment shall be used only for operations for which it is approved and as recommended by the manufacturer and maintained in good repair in accordance with manufacturer's specifications.

4.2.13 All personnel involved in a hot work operation have the authority and responsibility to stop any work that they consider to be unsafe. Refer to *S3AM-002-PR1 Stop Work Authority.*

4.2.14 Employees assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment will be thoroughly instructed in the safe use and maintenance of such equipment by a qualified person.

4.2.15 If other Employees are required to work in the vicinity of hot work operations, they shall be protected, given the required PPE, and be notified of the work and all safety procedures prior to starting the hot work (e.g., screens, signs identifying workpieces that are hot, barricades and restricted entry to hot work area, etc.).

4.2.16 Exposure to welding operations can result in eye damage, burns, or respiratory illness. If an incident occurs, seek medical attention and report it to the Manager or Supervisor. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*.

4.2.17 Training shall be provided as to the use of Hot Work Permits to all associated Employees in accordance with *S3AM-003-PR1 SH&E Training*.

4.3 Training

4.3.1 Employees shall be trained and, as applicable, certified in accordance with anticipated tasks (e.g. Welding, Air Monitor, Fire Watch, etc.), associated hazards, and jurisdictional requirements (e.g., Mexico - annual training to safety procedures of the welding and cutting program). Refer to *S3AM-003-PR1 SH&E Training*.

4.3.2 Training shall be provided as to the use of Hot Work Permits to all associated Employees in accordance with *S3AM-003-PR1 SH&E Training.*

4.4 Personal Protective Equipment

4.4.1 Selection and use of personal protective equipment shall comply with *S3AM-208-PR1 Personal Protective Equipment.*

- Contact lenses should not be worn if there is a potential exposure to chemicals that can irritate the eye.

4.4.2 Eye and Face Protection

- ANSI/CSA-approved welding helmets and hand shields shall be used during all arc welding/cutting operations, excluding submerged arc welding. ANSI/CSA-approved cutting / welding goggles shall also be worn during arc welding/cutting operations. The goggles or glasses may be either clear or colored glass, depending on the type of exposure in welding operations.
- If required to observe the welding operation, use an ANSI/CSA-approved welder's helmet fitted with a filter shade that is suitable for the type of welding that is being performed.
- If required to observe the chipping and grinding operation, use ANSI/CSA-approved impact rated safety goggles or safety glasses with both UVA and UVB radiation protection along with an ANSI/CSA-approved impact rated face shield or welder's helmet.
- ANSI/CSA-approved safety goggles or other ANSI/CSA-approved eye/face protection shall be used during light work gas welding operations, torch brazing, or inspection.
- Hot Work Operators and attendants on resistance welding or brazing equipment shall use ANSI/CSA-approved face shields or goggles, depending on the particular job.

4.4.3 Protective Clothing

- All welders shall wear flameproof gauntlet gloves.
- Welders shall wear approved fire resistant welding jackets or aprons made of leather, or other suitable material for protection against radiated heat and sparks.
- Fire-resistant clothing (FRC) or, as permitted, clothing made of natural fibers (wool, cotton) is required for welders and others working with the Hot Work Operators. Synthetic materials are prohibited.
- ASTM/CSA-approved steel-toed boots with a minimum of 6 inches (15.24cm) of ankle support.

4.4.4 Respiratory Protective Equipment

- Respiratory protective equipment will be selected, used, and maintained in accordance with *S3AM-123-PR1 Respiratory Protection*.
- Respiratory protective equipment shall be required when feasible engineering controls are insufficient to mitigate the respiratory hazards.
- Respiratory protective equipment may be required when one or more of the following conditions exist:
  - Room size (with special regard to ceiling height) is limited, or welding/cutting work is extensive and ventilation is limited.
  - Several welders are working in the area at the same time.
  - Potentially unsafe atmospheric conditions exist.
  - Hazardous fumes, gases, or dusts of toxic metals, particularly lead, cadmium, chromium, beryllium, and zinc, are present in the base metal or in coatings.

4.5 Non-Permissible Areas

4.5.1 All hot work is prohibited in areas not authorized by facility management and the following areas:

- In sprinkler-equipped buildings where sprinklers are impaired, unless the requirements of NFPA 25 are met (or equivalent local standard);
- In the presence of explosive atmospheres (greater than or equal to 10 percent of the LEL); or
- In the presence of unclean or improperly prepared tanks, vessels or other containers and equipment that have previously contained flammable or combustible materials when their contents may be exposed to an ignition source.

4.6 Hot Work Permit

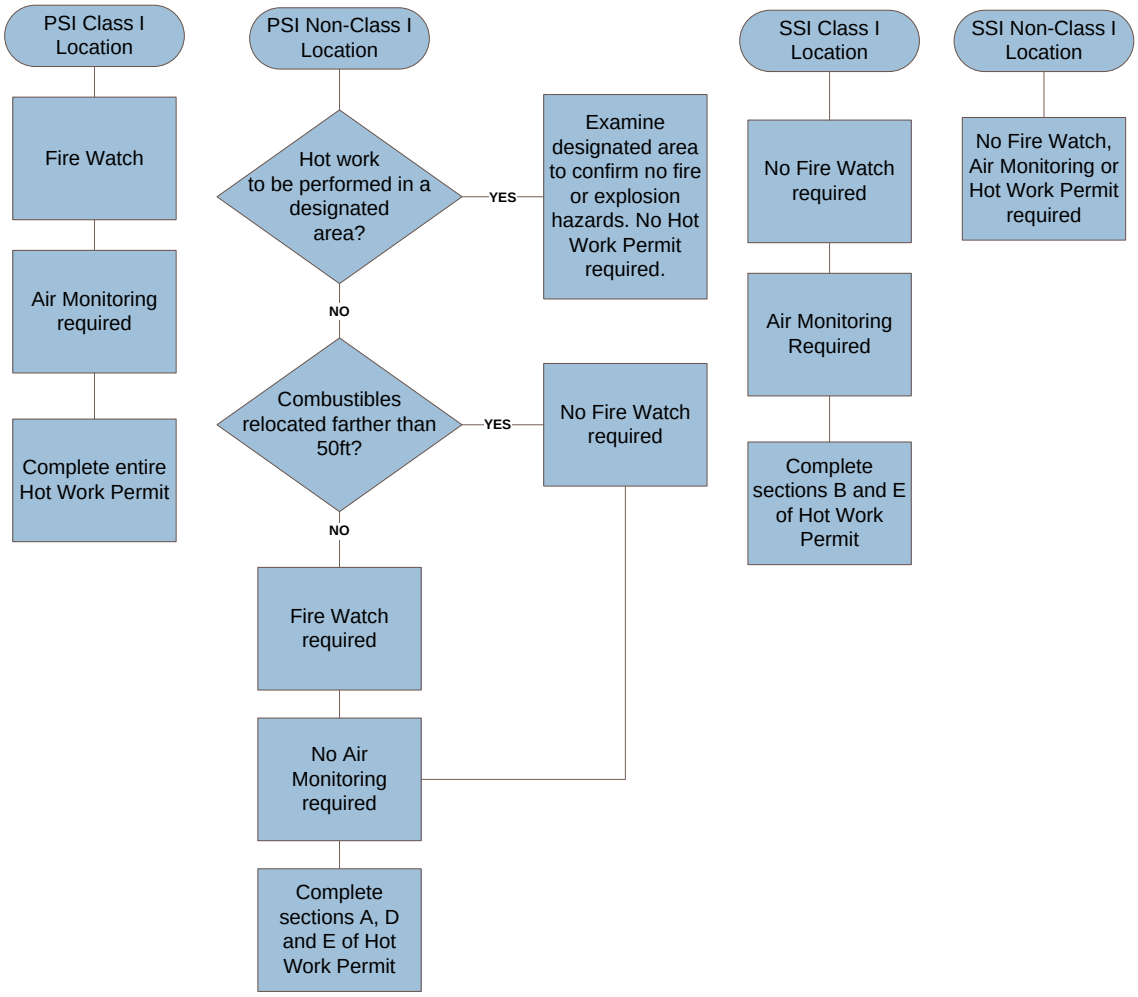
4.6.1 A Hot Work Permit is required and shall be prepared before any PSI hot work (other than in a designated area) or any SSI Class 1 Location hot work is performed. Any volatile contaminants (surface or subsurface) on sites shall be evaluated to determine if the definition of Class 1 is met.

4.6.2 A Hot Work Permit is not required for SSI non-Class 1 Location hot work.

4.6.3 A Hot Work Permit is valid for no more than one work shift.

- If hot work is suspended during a shift, the permit shall be revalidated before further hot work can continue.
- Revalidation involves inspecting the hot work area for any change to previous conditions and conducting air monitoring if the hot work is performed in a Class 1 Location.

4.6.4 Hot Work Permit Applicability



4.6.5 Air Monitoring Program

- An Air Monitoring Program shall be developed before any Class 1 hot work is performed.
- The following information, which is documented in Section B of *S3AM-332-FM1 Hot Work Permit* or equivalent, shall be included in the Air Monitoring Program:
  - The area where the hot work shall be performed, including the specific points where the hot work will be performed.
  - All hot work equipment (ignition sources) and all potential sources of flammable gas within 50 feet (15.24 meters) of the hot work. Examples of potential sources of flammable gas include sumps, drains, flanges, valves, liquid boots, excavations and all confined areas and equipment located within them, such as floating roof pontoons, piping, excavations, vessels and boreholes or wells with potentially flammable gases.
  - The area that shall be monitored by the Authorized Air Monitor. At a minimum, this includes a 50-foot (15.24-meter) radius from the point of the hot work. Hot work in a confined space requires air monitoring for flammable gas throughout the entire space. Refer to *S3AM-301-PR1 Confined Spaces*.
- All air monitoring associated with hot work shall be conducted by an Authorized Air Monitor who is trained and competent in the use of the instrument and hazards of the monitored area.
- The instrument(s) used for air monitoring shall be calibrated by the Authorized Air Monitor prior

to use, refer to *Q2-312-PR1 Monitoring and Measuring Equipment Procedure.* The Authorized Air Monitor shall maintain documentation of the calibrations in Section B –of *S3AM-332-FM Hot Work Permit* or equivalent form.

- Air monitoring equipment is to produce an audible alarm when LEL exceeds the established set point (e.g. 5 percent or 10 percent). The authorized air monitor shall remain in hearing range of the audible alarm and locate the air monitoring equipment between the hot work and potential vapor source. More than one instrument may be needed to monitor the air properly.
- Initial readings shall be recorded in Section B–of *S3AM-332-FM Hot Work Permit* or equivalent form prior to signing the permit. If readings are >0%, Section C – LEL Mitigation Plan or equivalent form shall be completed.

4.7 LEL Mitigation Plan

4.7.1 Section C of *S3AM-332-FM1 Hot Work Permit* documents the location of confirmed sources of flammable gas and the controls needed to eliminate, reduce or maintain the LEL reading to less than 10 percent (or 5% in certain jurisdictions) of the LEL.

4.7.2 An LEL Mitigation Plan shall be developed and implemented if the presence of flammable gas is detected (LEL greater than 0 percent) at any time during the hot work.

4.7.3 The following information shall be documented in Section C of *S3AM-332-FM1 Hot Work Permit* or equivalent form:

- The percent of the LEL that was measured;
- The identified source(s) of the flammable gas within the hot work area;
- The controls, if any, that shall be implemented to effectively eliminate, reduce or maintain the flammability level to less than 10 percent (or 5% in certain jurisdictions) of the LEL within the hot work area; and
- The percent LEL measured after controls, if any, have been implemented.

  Note: If at any time the LEL reading is greater than or equal to the safety factor of 10 percent (or 5% in certain jurisdictions) of the LEL, the hot work shall stop immediately and shall not resume until controls are implemented to reduce the LEL level to less than the safety factor (as per jurisdiction, 5% or 10%) of the LEL.

4.8 Fire Watch Requirements

4.8.1 A Fire Watch is required whenever the hot work meets any of the following criteria:

- The hot work consists of PSI Class 1 hot work.
- The PSI hot work will be performed:
  - Within 50 feet (15.24 meters) of shielded combustible material;
  - Within a 50-foot (15.24-meter) radius of wall or floor openings that expose combustible materials;
  - Adjacent to metal partitions, walls, ceilings or roofs that are in contact with combustible materials on the other side and are likely to be ignited by conduction or radiation; or
  - Where fire alarms or suppression systems have to be disabled.

4.8.2 In some cases more than one fire watch may be necessary (e.g. various levels in a building). This shall be identified in the SH&E Plan and the THA.

4.8.3 The Fire Watch shall be in the ready position at all times while hot work is being performed. The ready position consists of the following:

- Being attentive to the hot work being performed.
- Properly positioning the fire extinguisher prior to the start of work.
- Always maintaining a line of sight to the hot work being performed.

4.8.4 The Fire Watch shall stop the work if he or she deems that:

- Unsafe conditions have developed.
- The work is exceeding the scope described in the Hot Work Permit.

4.8.5 A Fire Watch shall be maintained for at least 30 minutes after completion of hot work operations so that possible smoldering fire can be detected and extinguished.

4.8.6 They shall be familiar with facilities and procedures in the event of a fire. The Fire Department shall be immediately notified of all fires.

4.8.7 A second Fire Watch shall be required if one Fire Watch cannot directly observe combustible materials that could be ignited by the hot work operation.

4.9 PSI Hot Work

4.9.1 PSI hot work, such as grinding, has been known to generate sparks with enough force to transport them up to 50 feet (15.24 meters) from the point of the hot work; therefore, it is possible to perform PSI hot work up to 50 feet (15.24 meters) away from a Class 1 location and yet still introduce an ignition source into a Class 1 area.

4.9.2 Prior to performing PSI hot work, the following requirements shall be met and shall be verified by the permit writer:

- All combustible and flammable materials shall be relocated at least 50 feet (15.24 meters) in all directions from the job site.

4.9.3 If relocating these materials is impractical (e.g. equipment, walls, floors, etc.), the following precautions shall be taken:

- The materials shall be shielded with fire-retardant covers or with metal or fire-retardant guards or curtains.
- The edges of covers at the floor shall be tight to prevent the entrance of sparks, including at the point where several covers overlap when a large pile is being protected.
- NOTE: Consideration should be given to spark-containment techniques that lessen the distance sparks are able to travel freely (e.g., fire-retardant screens, guards, spark/slag catcher).
- A fully charged and operable fire extinguisher appropriate for the type of potential fire shall be available for use in the work area (20 pounds [9.07 kilograms] minimum), refer to *S3-NA-106-PR1 Fire Protection* procedure.
- A non-flammable, impervious material shall seal sewer openings, ducts and drains. Where sealing is insecure or impractical, water spray or stream should be directed across openings.
- The location of the hot work relative to combustible and flammable materials and classified areas shall determine the need for a Fire Watch, as outlined in this practice. Personnel within the vicinity of the hot work shall be suitably protected against such dangers as heat, sparks, flash and slag.

4.10 Preparation for PSI Class 1 Location Hot Work

4.10.1 Prior to performing any PSI Class 1 hot work, the requirements set forth for All PSI Hot Work and the relevant requirements of air monitoring of this practice shall be met and verified by the permit writer. Additional requirements include:

- The venting, draining or bleeding of flammable or combustible liquids and gases shall be stopped within 50 feet (15.24 meters) of the hot work.
- Affected excavations, conduits and manholes within 50 feet (15.24 meters) of the hot work shall either be monitored for the presence of flammable gas or sealed to confirm that an ignition source is not introduced.
- NOTE – Non-intrinsically safe tools (including cell phones) are prohibited from use in Class 1 Locations, except as defined in Initial and Continuous Hot Work Air Monitoring, regarding SSI Class 1 Hot Work.

4.11 Preparation for PSI Hot Work within 50 feet (15.24 meters) of Buildings or Other Structures

4.11.1 The conditions in Preparation for all PSI Hot Work shall be met and verified before any PSI hot work is performed inside or within 50 feet (15.24 meters) of buildings or structures with building materials or contents that may be combustible or flammable. Additional requirements include:

- Openings or cracks in walls, floors or ducts within 50 feet (15.24 meters) of the hot work shall be tightly covered with fire-retardant or non-combustible materials to prevent the passage of sparks to adjacent areas.
- Ducts that might carry sparks to distant combustible or flammable materials shall be shielded, shut or both.
- If hot work is performed near walls, partitions, ceilings or roofs of combustible materials, fire-retardant shields or guards shall be provided to prevent ignition.
- If hot work is done on one side of a wall, partition, ceiling or roof, combustibles on the other side shall be relocated if possible. If it is impractical to relocate combustibles, a Fire Watch shall be provided on the side of the combustibles.
- Hot work shall not be attempted on a partition, wall, ceiling or roof with a combustible covering or insulation, or on walls or partitions of combustible sandwich panels or similar construction.
- If the hot work is close enough to cause ignition by conduction, it shall not be performed on pipes or other metal that is in contact with combustible walls, partitions, ceilings roofs or other combustibles.
- The following shall apply to hot work performed in close proximity to a sprinkler head:
    - A wet rag shall be laid over the sprinkler head and then removed at the conclusion of the welding or cutting operation.
    - Special precautions (e.g., ventilation, shielding) shall be taken during the hot work to avoid accidental operation of automatic fire suppression systems. Consultation with the building owner, system manufacturer or other authority may be required.

4.12 SSI Class I Location Hot Work

4.12.1 Periodic up to continuous air monitoring, as determined by the permit writer and documented on the Hot Work Permit Section B –*S3AM-332-FM1 Hot Work Permit* or equivalent form shall be performed and the results documented.

4.12.2 NOTE: Non-intrinsically safe tools (including cell phones) are prohibited from use in Class 1 areas, except as defined in Initial and Continuous Hot Work Air Monitoring, regarding SSI Class 1 hot work.

4.13 Air Monitoring (Class 1 Locations)

4.13.1 Flammable and combustible liquids and gases are present in Class 1 Locations. In order to perform hot work safely in these areas, initial and continuous air monitoring is required to confirm that any flammable gas in the work area is detected and properly controlled.

- Hot work is prohibited if air monitoring readings are greater than or equal to 10 percent of the

LEL (or 5% in certain jurisdictions).

4.13.2 If the hot work will be performed in a tank or vessel, the air monitoring requirements for confined spaces shall apply. Refer to *S3AM-301-PR1 Confined Spaces*.

4.13.3 When the possibility exists for an oxygen-deficient atmosphere, the oxygen level could be below the level (10 percent oxygen) required by the air monitor to give the correct flammability (LEL) reading.

- Alternate testing methods shall be required to accurately assess the flammability hazard.
- This may occur where a tank, vessel or piping contains an inert gas such as nitrogen or carbon dioxide. For this reason, it is important to monitor oxygen levels prior to monitoring for LEL.

4.13.4 Continuous Hot Work Air Monitoring (PSI Class 1 Locations)

- All PSI Class 1 Location hot work requires attended continuous air monitoring while the hot work is being performed.
- An Air Monitor shall survey the perimeter of the permitted area at least once an hour. The survey shall cover at least a 50 feet (15.24 meters) radius from the point of the hot work.
- When not conducting a periodic perimeter survey, the authorized gas tester shall be primarily positioned between the hot work and any potential sources of flammable gas.
- NOTE: The use of several air monitors around the hot work should be considered, depending on the work location. If more than one continuous monitor is in use, only one instrument needs to be actively attended.
- Readings from continuous air monitoring and hourly surveys should be recorded on the Hot Work Permit, even if the monitors do not alarm and the readings do not differ from the initial air monitoring results.
- If initial air monitoring readings are 0 percent LEL, but continuous air monitoring indicates the presence of flammable gas (greater than 0 percent of the LEL), the hot work shall stop and an LEL Mitigation Plan shall be developed, documented, and implemented.
- If the implementation of the LEL Mitigation Plan controls the flammability level to the safety factor of less than 10 percent (or 5% in certain jurisdictions) of the LEL, the authorized gas tester will continue monitoring the area while hot work continues.
- If at any time the LEL reading reaches the safety factor (as per jurisdiction, 5% or 10%), the hot work shall stop until the source of the flammable gas is controlled to less than the jurisdictional safety factor of the LEL.
- During drilling operations, where the potential of flammable gas is known to exist, the borehole may be classified as a Class 1 Location and continuous gas monitor shall be used in the immediate proximity of the top of the hole.

4.13.5 Initial and Continuous Hot Work Air Monitoring (SSI Class 1 Locations)

- Vehicles, mobile plant equipment and other non-intrinsically safe equipment present potential ignition sources. Consequently, SSI hot work in Class 1 Locations (e.g., a tank dike) requires the completion of a Hot Work Permit and air monitoring.
- Air monitoring shall be performed for SSI hot work in Class 1 Locations:
    - Before a vehicle or equipment that is not intrinsically safe is allowed to enter the Class 1 area, an authorized gas tester shall survey the area along its planned path to its destination.
    - The vehicle or equipment can proceed into the classified area only when flammability readings are 0 percent LEL, or less than 10 percent (or 5% in certain jurisdictions) of the

LEL with an implemented LEL Mitigation Plan.

- Continuous air monitoring shall be performed as long as the vehicle's engine or non-intrinsically safe equipment is running and initial monitoring is greater than 0 percent.
- If the vehicle or non-intrinsically safe equipment is shut off, it shall not be restarted until the area around the vehicle or non-intrinsically safe equipment is surveyed for flammable gas.
- The planned egress of the vehicle or equipment from the Class 1 Location shall be surveyed for flammable gas prior to its departure from the area.
- Periodic up to continuous air monitoring, as determined by the risk assessment, shall be performed and documented on the Hot Work Permit.

4.14 Welding and Cutting General Requirements

4.14.1 Avoid looking directly at the welding arc.

4.14.2 Avoid prolonged exposure to welding/paint fumes.

4.14.3 Avoid touching recently welded joints.

4.14.4 Welding/Cutting on Containers

- No welding, cutting, or other hot work shall be performed on empty drums, barrels, tanks, or other containers until they have been thoroughly cleaned and it is absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which, when subjected to heat, might produce flammable or toxic vapors. Any connection to the drum or vessel shall be disconnected or blanked off.
- All hollow spaces, vacancies, or containers shall be ventilated to remove gases before preheating, cutting, or welding. Purging with inert gas is recommended.
- In addition to the requirements presented in *S3AM-301-PR1 Confined Spaces*, welding/cutting in confined spaces such as a tank, boiler, pressure vessel, or small compartment shall require the following precautionary measures:
  - Local exhaust ventilation shall be provided, unless workers wear supplied-air respirators.
  - Gas cylinders and/or welding machines shall be placed outside the confined space.

4.14.5 If irritation or "red eye" occurs as a result of welder's flash, employees shall contact non-emergency medical support immediately through the applicable AECOM-dedicated line. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation* and *S3AM-012-PR1 First Aid*. Symptoms may include:

- Pain that may be mild to very severe;
- Bloodshot eyes;
- Light sensitivity;
- Watery eyes;
- Blurred vision; and
- The feeling of having something in the eye.

4.14.6 Employees should seek urgent medical help, in accordance with *S3AM-004-PR1 Incident Reporting* and *S3AM-012-PR1 First Aid*, if any of the following symptoms are experienced:

- Blurred vision;
- Vision changes;
- Seeing spots or flashes of light;

- Pain when moving eyes; and
- Worsening pain.

4.15 Gas Welding and Cutting Safety Requirements

4.15.1 Fuel-gas hoses and oxygen hoses shall be easily distinguishable from each other. The contrast shall be made by different colors or by surface characteristics readily distinguishable by touch. Oxygen and fuel-gas hoses shall not be interchangeable. A single hose having more than one gas passage shall not be used.

4.15.2 When parallel sections of oxygen and fuel-gas hose are taped together, not more than 4 inches (10 centimeters) out of 12 inches (30.5 centimeters) shall be covered by tape.

4.15.3 All hoses in use shall be inspected at the beginning of each work shift. Defective hose shall be immediately removed from service.

4.15.4 Hoses, cables, and other equipment shall be kept clear of walkways, ladders, and stairs.

4.15.5 Clogged torch tip openings shall be cleaned with approved cleaning wires, drills, or other devices designed for this purpose.

4.15.6 Torches to be used shall be inspected at the beginning of each work shift for leaking shutoff valves, damaged hose couplings, and clogged tip connection. Defective torches shall not be used.

4.15.7 Torches shall be ignited by friction lighters or other approved devices only. Matches and, flame lighters shall not be used to ignite a torch.

4.15.8 Oxygen and fuel-gas pressure regulators, including related gauges, shall be in proper working order and equipped with “Flashback” arrestors attached to the gauges. NOTE: Flashback arresters are in addition to “Backflow” devices.

4.15.9 All oxygen cylinders and fittings shall be kept away from oil or grease.

- Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves.
- Oxygen shall not be directed at oily surfaces or greasy clothes, or used within a fuel oil or other storage tank or vessel.

4.15.10 Torches and hoses shall be completely depressurized (bled) of pressurized gas, prior to storage, or at the end of each shift.

4.15.11 Torches and hoses shall not be stored in enclosed areas (e.g., gang boxes, lockers) while connected to cylinders and gauges shall be removed at the end of shift.

4.15.12 Oxygen connections shall include a means to prevent backflow.

4.15.13 Fuel-gas cylinders shall be provided flashback protection.

4.16 Arc Welding and Cutting Safety Requirements

4.16.1 Electrode holders that are designed for arc welding/cutting and are capable of safely handling the maximum rate current shall be used.

4.16.2 Any current-carrying parts passing through the holder which the arc welder or cutter grips in his/her hand, or the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered and properly grounded.

4.16.3 Grounding is required of the welding machine and the welding circuit.

- Grounding the welding machine is not required if the machine is not double insulated, as indicated by the box-within-box symbol on the rating plate.
- The ground clamp or ground lead (separate from the workpiece connection or workpiece lead) shall connect the workpiece, or the metal table the workpiece rests upon, to a suitable ground,

such as a metal building frame.

4.16.4 All arc welding/cutting cables shall be completely insulated and flexible, capable of handling the maximum current requirements of the work.

4.16.5 Only cables free from repair or splices for a minimum distance of 10 feet (3 meters) from the electrode holder shall be used. Cables with standard insulated connectors or splices with insulating quality that is equal to that of the cable are permitted.

4.16.6 If it is necessary to splice lengths of cable, insulated connectors equivalent to that of the cable shall be used. If connections are made by cable lugs, they shall be securely fastened together and provide good electrical contact. Exposed metal parts of the lugs shall be completely insulated.

4.16.7 If electrode holders are left unattended, the electrodes shall be removed and the holder placed so that they cannot make electrical contact with employees or conducting objects.

4.16.8 To avoid the possibility of electric shock, particularly in humid or damp environments, appropriate and dry PPE shall be worn. Electrode holders shall not be dipped in water.

4.16.9 When the arc welder or cutter leaves work, stops work for any length of time, or when the arc welding cutting machine is to be moved, the power supply to the equipment shall be turned off.

4.16.10 Any faulty or defective equipment shall be reported to the Supervisor and tagged out of service until repaired.

4.16.11 All arc welding/cutting operations shall be shielded by non-combustible or flameproof screens to protect employees and other persons working in the vicinity from the direct ray of the arc.

4.17 Storage and Handling of Compressed Gas Cylinders

4.17.1 Compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas in accordance with Globally Harmonized System (GHS) or Workplace Hazardous Materials Information System (WHMIS) standardized labelling. Such markings will be stenciled, stamped, or labelled and shall not be easily removable.

4.17.2 The marking shall be located on the shoulder of the cylinder.

4.17.3 Compressed gas cylinders shall be equipped with approved connections.

4.17.4 Acetylene cylinders shall be stored and used valve end up.

4.17.5 Cylinders shall not be stored near highly combustible/flammable materials, especially oil or grease.

4.17.6 All cylinders shall be stored in an upright and secured position (with chains) with caps installed and separated from fuel-gas cylinders or combustible materials (especially oil or grease), by a minimum distance of 20 feet (6 meters), or by a non-combustible barrier at least 5 feet (1.5 meters) high and having a fire-resistance rating of at least one half hour.

4.17.7 Cylinders shall be not dropped, struck by objects, or permitted to strike each other violently.

4.17.8 Cylinder valves shall be closed, gauges removed and caps installed before moving cylinders.

4.17.9 Cylinder valves shall be closed and gauges removed at the end of the shift or when work is finished.

4.17.10 Valves of empty cylinders shall be closed.

4.17.11 Cylinders shall be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames shall not reach them.

4.17.12 Cylinder valves shall always be opened slowly.

4.17.13 An acetylene cylinder valve shall not be opened more than one and one-half turns of the valve stem and preferably no more than three-fourths of a turn.

4.17.14 Do not use acetylene at a pressure in excess of 15 pounds per square inch (psi) gauge pressure, or 30 psi absolute.

4.17.15 Where a special wrench is required to operate a cylinder valve, it shall be left in position on the stem of the valve while the cylinder is in use. In the case of manifolded or coupled cylinders, at least one such wrench shall be available for immediate use.

4.17.16 Regulators shall be removed, valve caps in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders shall have a proper support rack installed.

4.17.17 A suitable cylinder truck, chain, or other steadying device shall be used to prevent cylinders from being knocked over while in use.

4.17.18 Cylinders shall not be placed where they may become part of an electric circuit. Tapping of an electrode against a cylinder to strike an arc shall be prohibited.

4.17.19 Only use warm, not boiling, water to thaw cylinders and valves.

4.17.20 Pressure Reducing Regulators:

- Pressure regulators, including the gauges, shall be in proper working order while in use. If not, immediately remove from service.
- Regulators shall be of an approved type for the type of gas to be utilized.
- When a pressure-reducing regulator is attached to a compressed gas cylinder, the cylinder valve shall be opened just slightly at first, so that the regulator can take on pressure slowly. After which, the valve may be turned open to its normal position. If the regulator takes on pressure too quickly, it can damage the regulator and pressure gauges.
- The operator shall stand to the side of glass covered gauges and not in front of them.

4.17.21 Manifolding of Cylinders

- Cylinder manifolds shall be installed under the supervision of a qualified person(s) and shall comply with proper practices in construction and use.
- All manifolds and parts shall be appropriate for the gases for which they are approved.
- When acetylene cylinders are manifold, approved flashback arresters shall be installed between each cylinder and the coupler block. One flash arrestor installed between the coupler block and regulator is acceptable only for outdoor use or if the number of cylinders coupled does not exceed three.
- Each cylinder lead shall be provided with a backflow check valve.

4.18 Mechanical Ventilation

4.18.1 Mechanical ventilation shall consist of either general dilution systems or local exhaust systems. Local exhaust systems are preferred. The applicable SH&E Plan shall identify ventilation requirements suitable to the work environment and anticipated hazards.

4.18.2 Mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fume and smoke within safe limits.

4.18.3 General dilution ventilation may not be used as the only means of control when toxic metals are involved in the operation.

4.18.4 Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits

4.18.5 Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air. Environmental regulations may require filtering or other cleaning of exhausted air.

4.18.6 All makeup air shall be clean and suitable for breathing.

4.18.7 Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.

4.18.8 The Supervisor shall provide appropriate methods and controls in the case of specific requirements (including welding rods and fluxes, paints and coatings) for materials containing zinc, lead, mercury, beryllium, cadmium, and stainless steel to be cut, heated, and/or welded.

5.0 Records

5.1 Retain completed *S3AM-332-FM1 Hot Work Permit* or equivalent form in the project files.

5.2 Documentation of employee training completed shall be retained in accordance with *S3AM-003-PR1 SH&E Training.*

6.0 Attachments

6.1 S3AM-332-FM1 Hot Work Permit

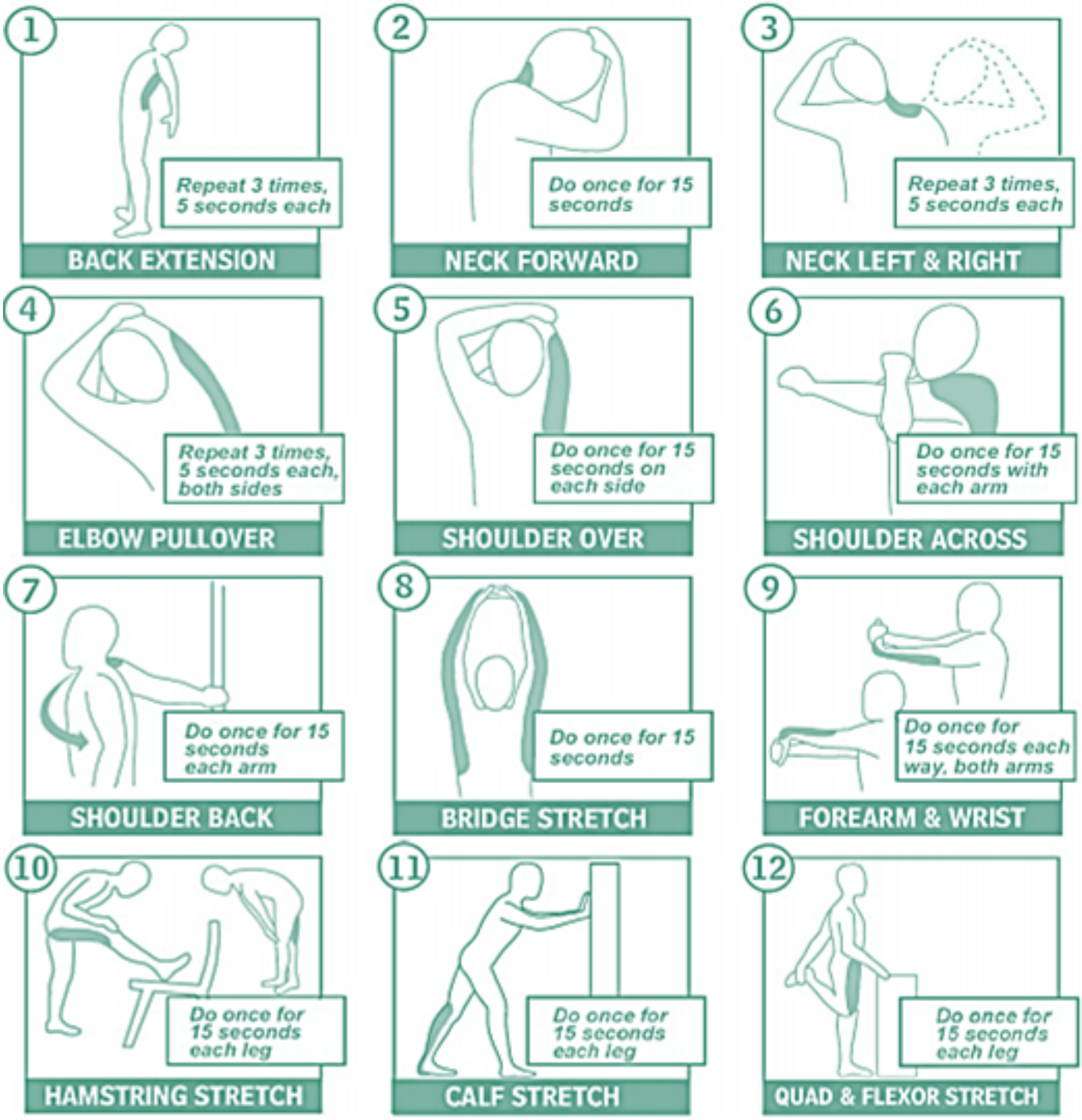
AECOM

Attachment C

Stretch/Flex Poster

Attachment C: Stretch/Flex Poster

Examples of Stretches



AECOM

Attachment D

Site Safety Orientation

Attachment D: Site Safety Orientation

AECOM will conduct a site safety briefing for a person's initial visit to the site. The briefing will be conducted:

- Prior to the start of work;
- For any new AECOM or subconsultant personnel;
- For Site Visitors; and
- At each mobilization, or whenever there is a change in task or significant change in task location.

All personnel working on the project who have received the site briefing (including the SWP review) will sign the Personal Acknowledgement located in **Section 20**. Visitors may receive a shortened version to address the hazards specific to their visit.

The following topics, at minimum, will be discussed during the site safety briefing:

- Contents of this SWP;
- The Emergency Response Plan (Section 4);
- Contractor SHE Management expectations;
- Injury management, including notification and hospital and occupational clinic locations;
- The AECOM 4-Sight program;
- Stop Work authority;
- The THAs (**Attachment A**) for the activities that will be performed on a given job;
- Types of hazards at the site and means for minimizing exposure to them;
- Instructions for new operations to be conducted, and safe work practices;
- PPE that must be used;
- Lone worker check-in procedures;
- Emergency evacuation routes, muster points, and tornado/storm shelters; and
- Location and use of emergency equipment.
- **These briefings must be documented and maintained in the project files.**

AECOM

Attachment E

Work Plan/Client and Host Facility SH&E Requirements

Attachment E: Work Plan/Client and Host Facility SH&E Requirements

Work Order Checklist

Work Order # Click or tap here to enter text.

Description		
WO #: [#]	**Short Description:** Hunts Point Monitoring Well Install & Soil Sampling	**Date: 5/14/2024**
Originator: Lyndsay Kresic	**Proposed Starte Date – Duration and Schedule** (days/weeks and start/end times): Click or tap here to enter text.	**Required in Service Date:** Click or tap to enter a date.
Project Manager: Click or tap here to enter text.	**Work Site Location:** Hunts Point SMS	
Change type: ☐ Permanent ☐ Temporary	**If temporary, expected duration:** Click or tap here to enter text.	

Instructions

Scope:

1)Prepare a letter workplan outlining the work to be done. 2)Prepare a hasp 3) call in utility clearance for 4 locations [3 soil boings 1 monitoring well]. 4)GPR for locations 5) hand clear locations down to 5 feet or bottom of expected excavation. 5)collect soil sample from interval with highest PID reading at each of the four locations and have them analyzed for VOC, SVOC, RCRA metals, TPH, PCB and PFAS. 6) install a 2-inch PVC monitoring well that straddles the water table via Direct push. 7) develop then sample the well for VOC, SVOC, TPH, PCB, Metals Flashpoint, TS/TSS, COD, chloride and TKN. 8) perform a slug test. 9) collect 2 separate soil samples or TCLP and waste characterization and one water sample for waste characterization. 10) have waste disposed of 11) create report documenting activities.

WO Instructions:

Click or tap here to enter text.

☒ Yes ☐ No	**New or modified drawings required: If yes:**

List new or modified drawings required:

Site Plan drawing of Hunts Point SMS showing the location of the monitoring well post-installation

Inspection Forms Required **(list applicable forms):** Click or tap here to enter text.
IPOC Procedures/Specifications **(list applicable procedure numbers):** Click or tap here to enter text.
Additional or Special Notifications Required: Click or tap here to enter text.
Implications of the change(s): Click or tap here to enter text.

Venting Checklist

☐ Yes ☒ No	Will gas be vented? If yes:

	• Must attach a Venting Notification Plan & Procedure
	• Venting Committee Meeting Date: Click or tap to enter a date.
	• Quantity of gas being vented: Click or tap here to enter text. MCF

Comments:
Click or tap here to enter text.

ROW Checklist

☐ Yes ☒ No	Will the work be outside the Iroquois fence? • Any work on ConEd's property has specific requirements. Review the ConEd Easement. • Verify with ROW Manager any specific easement conditions.
☐ Yes ☒ No	Will any work take place off existing ROW?

ROW #	*Property Owner	Address	Phone #
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

**Contact Row Manager if property owner cannot be determined.*

☐ Yes ☒ No	Will any work take place in Schoharie County? If so, refer to FOP-04-A-01

Comments: (List additional ROW #s below or attach a separate list to Work Order)
Work will take place at Hunts Point SMS - consultation with ConED may be required.

Operator Qualifications

If the work includes OQ covered tasks (question 1) and you answer NO to question 2 or 3, please provide a comment explaining why you did not verify the OQ qualifications. The project originator is responsible for verifying OQ qualifications.

☐ Yes ☒ No	1. Does the work include OQ covered tasks?
☐ Yes ☐ No	2. Did you verify IPOC Operator Qualifications?
☐ Yes ☐ No	3. Did you verify Contractor Qualifications?
☐ Yes ☐ No	4. Will *both* Iroquois and the Contractor be performing the OQ tasks? **If so, attach a blank G-3 form**

☐ Yes ☐ No	5. Will the work cause a change to OQ requirements? (i.e., new equipment that will now require OQ tasks)

List OQ Tasks Required:
The driller needs to be licenced as well as the waste hauler.

Field Operations and Engineering Services

☐ Yes ☒ No	Is the work performed in the Shelton Complex?
☐ Yes ☐ No	Was FOP 04-A-01 reviewed for Commitment Requirements?

Comments:
Click or tap here to enter text.

Corporate Communications Checklist

☐ Yes ☐ No	Will work include significant noise?
☐ Yes ☐ No	Will the work include any disruption to the community/neighborhood? (i.e., noise, traffic, parking, etc.)

Comments:
Click or tap here to enter text.

Transportation Checklist

☐ Yes ☒ No	Could this affect gas pressure or flows?
☐ Yes ☒ No	Could this affect SCADA data?
☒ Yes ☐ No	Could this trigger SCADA alarms?
☐ Yes ☒ No	Will there be new or modified SCADA Tags required? • **If yes**, SCADA commissioning checklist is required to be attached to the WO.
☐ Yes ☒ No	RTU/PLC Code Change? • **If yes,** re-commission safety points and attach list to Wo. • **If yes,** describe change in comment box below.

Comments:
If there is vibration monitoring near the drill rig, there is a possibility that it may set off the SCAD alarm. We will confirm vibration monitoring prior to start.

Environmental Checklist	
☒ Yes ☐ No	1. Will the work cause / involve **any ground disturbance…?**
☒ Yes ☐ No	2. Will material be removed?
☐ Yes ☒ No	3. Will the work involve any **agricultural lands…?**
☐ Yes ☒ No	4. Will the work involve any **disturbance of a stream bed/ bank…?**
☐ Yes ☒ No	5. Will the work cause / involve **disturbance of a wetlands…?**
☐ Yes ☒ No	6. Will the work involve **vegetation maintenance…?**
☐ Yes ☒ No	7. Will the work involve **hazardous materials…?** (e.g.: asbestos gasket removal).
☐ Yes ☒ No	8. Will the work involve **residual materials…?**
☐ Yes ☒ No	9. Will the work cause / involve **significant release of water…?**
☐ Yes ☒ No	10. Will the work cause / involve **release of foreign material on the ground…?**
☐ Yes ☒ No	11. Will the work cause / involve **removal of material from a pipeline…?**
☐ Yes ☒ No	12. Will the work cause / involve **off-road vehicular access…?**
☐ Yes ☒ No	13. Will the work cause / involve **visual or auditory pollution?**
☐ Yes ☒ No	14. Will the work involve **installation or modification of fuel burning equipment?**
☐ Yes ☒ No	15. Will the work take place at the **Wimisink Reserve**, Sherman, CT? **If yes,** refer to the Environmental Procedure ENV-E-09, Long Term Right of Way Maintenance Plan for Connecticut, Section 6.312.

Comments:
The drill rig will make noise akin to that of a truck for the duration of the drilling.

Safety Checklist		
PPE checklist in the Health and Safety Procedure H&S F-05 can be used for guidance or selection and use of PPE to address various hazards in the workplace.		
☒ Yes ☐ No	**Eye and face protection is required:** ☒ ANSI Safety Glasses ☐ Screened Face Shield ☐ Chemical Goggles ☐ Face Sheld ☐ Arc Rated Face Shield ☐ Welding Helmet or Goggles ☐ Other – List in Comments	**Hazards:** Chemical Flying Objects Hazardous Dust Radiation – High Intensity Light
☒ Yes ☐ No	**Head and body protection is required:** ☒ Hard Hat ☒ Steel Toe Shoes ☐ Flame Retardant Clothing ☐ Chemical Protective Clothing ☐ Electrical Rated Clothing ☐ Arc Rated Hardhat ☐ Chemical Boots ☐ Reflective Wear or Vests ☐ Tyvek Suit ☒ Other – List in Comments	**Hazards:** Gas Venting Operations Chemical Flying or Falling Objects Hazardous Dust Work Zone Safety Radiation – High Intensity Light
☐ Yes ☒ No	**Respiratory Protection** ☐ Dusk Mask ☐ Particle Respirator ☐ Air Supplier Hood ☐ Organic Cartridge Respirator ☐ SCBA ☐ Other – List in Comments	**Hazards:** Hazardous Dusts Hazardous Chemical NORMs or TENORMs Oxygen Deficient Environment
☒ Yes ☐ No	**Hand Protection** ☒ Work Gloves ☒ Disposable Gloves ☐ Neoprene Chemical Gloves ☐ High Temp Gloves ☐ Electrical Rated Gloves ☐ Other – List in Comments	**Hazards:** Struck by Object Hazardous Chemical NORMs or TENORMs Electrical Hazards Cut Hazards

☒ Yes ☐ No	**Other Personal Protective Equipment (PPE)** ☐ Fall Protection ☒ Hearing Protection ☐ Life Vests (marine) ☐ Other – List in Comments	**Hazards:** Fall from Elevation Noise Drowning

Comments (Safety Checklist):
High visiblility safety vests.

HASP – Health and Safety Planning

Are any of the following topics or categories of work listed below planned or could reasonably be anticipated being performed in association with the proposed work.

Applies to CWO	Topic or Category	Requirements
☐ Yes ☒ No	Work in Confined Space	Check Permit type needed – PRCs need to be reviewed by H&S Review, H&S procedure
☐ Yes ☒ No	Use Ladders, man-lifts or scaffolding	Scaffold inspection, trained person on fall prevention.
☐ Yes ☒ No	Welding, Cutting or Brazing	Person trained in hot works to be on site, hot work permit completed.
☐ Yes ☒ No	Excavation or Trenching	Trained competent person on job site. Trench inspection done before entry if 5 feet or deeper
☐ Yes ☒ No	Hazardous Chemicals: aerosols, degreasers, paints, coatings, etc.	Hazard Communication, SDS and awareness of chemicals being used onsite.
☐ Yes ☒ No	Hazardous atmospheres	Hot Work Permit, leak detection with device, equipment in hazardous locations training
☐ Yes ☒ No	Hazardous Material Review	Hot Work Permit (BOM) (New and As-Built) Checked for Hazardous Materials including Asbestos
☐ Yes ☒ No	Bill of Material (BOM) indicates Asbestos	If YES, follow procedure for handling asbestos: H&S-1-02
☐ Yes ☒ No	Lock-Out / Tag-Out	Follow LOTO procedures if provided for the job. LOTO training for authorized employee. All employees working on equipment must lock out of the equipment.
☐ Yes ☒ No	Work within roadway or road right of way, including road crossings	Work Area Protection
☐ Yes ☒ No	Lifting Operations: Cranes, Hoists & Slings	Material handling equipment training, competent person directing lifts. Lift equipment inspected for defects prior to lifting. Is a LIFT PLAN needed?
☒ Yes ☐ No	Chain saws, powered cutting tools	Training on proper PPE to be worn. Spotters may be needed for large trees.

☐ Yes ☒ No	Fire system Impairment	Notification needed for any extended system impairments.
☐ Yes ☒ No	Pipeline Liquids	NORMs or TENORMs training, additional PPE and monitoring may be required
☐ Yes ☒ No	Dust particulate, organic vapors	Respiratory protection training, don proper respirator type or cartridge. Oxygen displacement may require for gas testing.

Comments:
Click or tap here to enter text.

AECOM

Attachment F

Project Hazardous Materials Communication Plan

Attachment F-1: Project Hazardous Materials Communication Plan

Materials to be brought or encountered onsite will have a Safety Data Sheet (SDS) maintained in an accessible location for workers to review. Applicable SDSs are presented in **Attachment F-2**. Materials to be brought or encountered onsite will include:

- Bentonite.
- Alconox
- Portland
- Isobutlylene
- Hydrochloric acid

As part of the Site Safety Officer (SSO) daily activities, an inventory of hazardous materials will be prepared with the quantities expected to be on site. The inventory will be updated if any additional materials are brought on site and as frequently as necessary to reflect accurate quantities. This chemical inventory list will be readily available for review (usually kept with the SDSs).

Unless each container has appropriate labeling, all chemical containers will be labeled with the following information:

- Product name and identity of the hazardous chemical(s).
- Appropriate hazard warnings.
- Name and address of the chemical manufacturer, importer, or other responsible party.

Labels on incoming containers of hazardous materials will not be removed or defaced. Labels are also required when a hazardous substance is transferred from a primary container to a secondary container. Labels on secondary containers must indicate the product name or the names of the hazardous substances contained therein as well as related physical and health hazards and their associated target organs. Labels may incorporate words, pictures, symbols, or combinations thereof to ensure the appropriate information is provided to the end user.

Examples of acceptable labeling systems include the National Fire Protection Association Diamond, the Hazardous Materials Identification System, the Chemical Hazard Identification and Training system, or similar.

Employee requirements for reviewing SDSs for specific safety and health protection procedures are presented below.

- AHAs will incorporate information contained in the SDSs.
- SDS information will be followed in the use and disposal of material and selection of hazard control and emergency response measures.
- The SSO will obtain an SDS for each chemical before it is used. SDSs will generally be received by the person ordering the product. SDSs for products frequently used should be kept on file because additional copies may not be included in repeat shipments.
- The SSO will review each SDS when it is received to evaluate whether the information is complete and to determine whether existing protective measures are adequate.
- The SSO will maintain a collection of all applicable and relevant SDSs in an area that is accessible to all employees at all times. An electronic database is an acceptable method of maintaining the SDSs.
- The SSO will replace SDSs when updated sheets are received and will communicate any significant changes to those who work with the chemical.

- SDSs are required for all hazardous materials brought on site by project personnel.

General household products to be used for their specific purpose, food, drugs, and cosmetics brought into the workplace for employee use and consumption are all exempt, as are supplies in the first-aid kit, such as isopropyl alcohol and antibacterial wipes.

Employees bringing hazardous materials on to a site or project must submit SDSs to the SSO. The SSO may restrict the use of certain hazardous materials on a site or project due to occupational health risk, hazardous physical properties of the material, or potential employee sensitivity to odor or irritating properties of the material.

Other personnel working in the same area shall be provided with the following information on chemicals used by or provided to AECOM personnel:

- Names of hazardous chemicals to which they may be exposed while on the jobsite.
- Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures, such as ventilation or isolation of the work. In some cases, as an administrative control measure, a task may be delayed to a time when a minimal number of employees are present in the area.
- Location of SDSs.

As discussed in Section 5.1 of the HASP, employees will be trained initially and periodically when use of hazardous or toxic agents is altered or modified to accommodate changing on-site work procedures. Training shall cover the following topics:

- Requirements and use of the hazard communications program on the project.
- The location of all hazardous or toxic agents at the project.
- Identification and recognition of hazardous or toxic agents on the project.
- Physical and health hazards of the hazardous or toxic agents pertinent to project activities.
- Protective measures employees can implement when working with project-specific hazardous or toxic agents.

Provide training to all employees who have the potential to be exposed to hazardous materials: a) at the time of the initial task assignment, b) whenever new chemicals are introduced into the workplace, and c) more frequently where required by site-specific conditions or client-specific requirements. This training will include the following:

- Applicable regulatory requirements.
- Location of the program, inventory, and SDS.
- Site-specific chemicals used and their hazards (chemical, physical, and health), including the general characteristics of the chemicals and signs and symptoms of exposure.
- How to detect the presence or release of chemicals including the location, types, and usage of any portable and fixed monitoring or detection equipment and their associated alarms, where applicable.
- Safe work practices (S3AM-001-PR1) and methods employees can take to protect themselves from chemical hazards (metals or explosives constituents in soil).
- How to read an SDS.
- Site- or project-specific information on hazard warnings and labels in use at the location, if applicable.
- Site-specific evacuation and rescue procedures in the event of chemical release, including the location of staging areas and personnel accounting procedures.

The following documentation will be maintained in the project file:

- Chemical inventory list;
- SDSs; and

- Training records.

Attachment F-2: Safety Data Sheets

Non-hazardous material safety data sheet for

Bentonite F2 Pellets

This generic SDS is provided by LKAB Minerals to give information to assist with material handling of the products listed which are not classified as hazardous under the GHS and / or the CLP regulations.

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

1.1 Product identifier

Product name:	Bentonite F2 Pellets
REACH registration number:	Exempt
CAS number:	1302-78-9
EC number:	215-108-5

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

Identified uses:	Borehole sealant

1.3 Details of the supplier of the safety data sheet

LKAB Minerals Ltd, Raynesway, Derby, DE21 7BE, UK
minerals.sds@lkab.com

1.4 Emergency telephone number of supplier

LKAB Minerals AB (Sweden)	+46 771 760 400
LKAB Minerals Asia Pacific Ltd (Hong Kong)	+852 2827 3000
LKAB Minerals BV (Netherlands)	+31 168 388500
LKAB Minerals Inc (USA)	+1 513 322 5530
LKAB Minerals GmbH (Germany)	+49 201 45060
LKAB Minerals Ltd (United Kingdom)	+44 1724 277411 or +44 1332 673131
LKAB Minerals Oy (Finland)	+358 17 2660160
LKAB Minerals Tianjin (China)	+86 22 2435 1706
Hours of operation:	09.00 – 16.00 (local business hours)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (EC 1272/2008): Physical and chemical hazards: not classified
Human health: not classified
Environment: not classified

The full text for all R-phrases and hazard statements are displayed in section 16.

2.2 Label elements

EC No:	215-108-5
Label in accordance with (EC) No. 1272/2008	No pictogram required.

2.3 Other hazards

This product does not contain any PBT or vPvB substances.

SECTION 3: Composition/information on ingredients

3.1 Substances

Product / ingredient name	%	CAS No	EC No	Classification Regulation (EC) No. 1272/2008 [CLP]
Bentonite	>99	1302-78-9	215-108-5	Not classified
Quartz	<1	14808-60-7	238-878-4	Not classified
Cristobalite	<1	14464-46-1	238-455-4	Not classified

The full text for all R phrases and hazard statements are displayed in section 16.

REACH Registration number: Exempt in accordance with Annex V.7

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation:	Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.
Ingestion:	Rinse mouth thoroughly. Get medical attention if any discomfort continues.
Skin contact:	Wash skin with soap and water. Get medical attention if irritation persists after washing.
Eye contact:	Make sure to remove any contact lenses from the eyes before rinsing. Rinse eye with water immediately. Get medical attention if any discomfort continues.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation:	No specific symptoms noted.
Ingestion:	No specific symptoms noted.
Skin contact:	No specific symptoms noted.
Eye contact:	No specific symptoms noted.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically

SECTION 5: Fire-fighting measures

5.1 Extinguishing media — This product is not flammable. Use fire extinguishing media appropriate for surrounding materials.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products: None under normal conditions

5.3 Advice for firefighters

Special fire-fighting procedures: No specific fire-fighting procedures given

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Follow precautions for safe handling described in this safety data sheet

6.2 Environmental precautions — The product should not be dumped in nature but collected and delivered according to agreement with the local authorities.

6.3 Methods and material for containment and cleaning up

Avoid dust formation. Remove spillage with vacuum cleaner. If not possible, collect spillage with shovel, broom or the like. Transfer to a container for disposal.

6.4 Reference to other sections — For personal protection see section 8. For waste disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling — Avoid handling which leads to dust formation. Avoid inhalation of high concentrations of dust. Observe occupational exposure limits and minimise the risk of inhalation of dust.

7.2 Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Keep in original container.

7.3 Specific end use(s) — The identified uses for this product are detailed in section 1.2

SECTION 8: Exposure controls / personal protection

8.1 Control parameters

Name	STD	TWA – 8hrs		STEL – 15mins		Notes
Bentonite	WEL	10 mg/m^3	4 mg/m^3			
Quartz	WEL		0.1 mg/m^3			
Cristobalite	WEL		0.1 mg/m^3			

WEL = Workplace Exposure Limit

Ingredient comments:

Dust contains respirable crystalline silica. Prolonged and/or massive inhalation of respirable crystalline silica dust may cause lung fibrosis, commonly referred to as silicosis. Principal symptoms of silicosis are cough and breathlessness. Occupational exposure to respirable dust should be monitored and controlled. The product should be handled using methods and techniques that minimise or eliminate dust generation. The product contains less than 1% w/w RCS (respirable crystalline silica) as determined by the SWERF method. The respirable crystalline silica content can be measured using the "Size-Weighted Respirable Fraction – SWERF" method. All details about the SWERF method is available at www.crystallinesilica.eu

8.2 Exposure controls

Protective equipment

Engineering measures:	Provide adequate ventilation. Observe occupational exposure limits and minimise the risk of inhalation of dust.
Respiratory equipment:	No specific recommendation made, but respiratory protection must be used if the general level exceeds the recommended occupational exposure limit. Wear dust masks in dusty areas.
Hand protection:	No specific hand protection noted, but gloves may still be advisable.
Eye protection:	Wear dust resistant safety goggles where this is a danger of eye contact.
Other protection:	Provide eyewash station.
Hygiene measures:	Wash hands at the end of each work shift and before eating, smoking and using the toilet.

SECTION 9: Physical and chemical properties

9.1 Information on basic and physical and chemical properties

Appearance:	Pellets
Colour:	Light or pale grey
Odour:	Odourless
Solubility:	<0.9 mg/L in water at 20°C.
Melting point (°C):	>450
Relative density:	2.0-2.5 g/cm^3
Bulk density:	1.0-1.4 g/cm^3
pH-Value:	9.0-10.5 (5% solids in water)

9.2 Other information Not relevant

SECTION 10: Stability and reactivity

10.1 Reactivity No specific reactivity hazards associated with this product.

10.2 Chemical stability Stable under normal temperature conditions.

10.3 Possibility of hazardous reactions Not relevant

10.4 Conditions to avoid No specific conditions are likely to result in a hazardous situation

SECTION 10: Stability and reactivity

10.5 Incompatible materials

Materials to avoid:	No specific, or groups of materials, are likely to react to produce a hazardous situation.

10.6 Hazardous decomposition products — None under normal circumstances

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity:	Not classified
Acute toxicity (Oral LD50):	No data available
Acute toxicity (Dermal LD50):	No data available
Acute toxicity (Inhalation LC50):	No data available
Skin corrosion/irritation:	Not classified (No data available)
Serious eye damage/irritation:	Not classified (No data available)
Respiratory or skin sensitisation:	Not classified (No data available)
Germ cell mutagenicity:	Not classified (No data available)
Carcinogenicity:	Not classified (There is no evidence that the product can cause cancer)
Reproductive toxicity:	Not classified (This substance has no evidence of toxicity to reproduction)
STOT-single exposure:	Not classified as a specific target organ toxicant after a single exposure
STOT- repeated exposure:	Not classified as a specific target organ toxicant after repeated exposure
Aspiration hazard:	Not classified (Not anticipated to present an aspiration hazard, based on chemical structure)

SECTION 12: Ecological information

12.1 Toxicity:	Not classified
12.2 Persistence and degradability	No data available.
12.3 Bioaccumulative potential:	No data available.
12.4 Mobility in soil:	Not relevant, due to the form of the product.
12.5 Results of PBT and vPvB assessment:	No data available.
12.6 Other adverse effects:	None known

SECTION 13: Disposal considerations

13.1 Waste treatment methods:	Dispose of waste and residues in accordance with local authority requirements.

SECTION 14: Transport considerations

Road transport notes:	Not classified
Rail transport notes:	Not classified
Sea transport notes:	Not classified
Air transport notes:	Not classified
14.1 UN Number:	The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).
14.2 UN proper shipping name:	Not classified for transportation.
14.3 Transport and hazard class(es):	Not classified for transportation.
14.4 Packing group:	Not classified for transportation.

SECTION 14: Transport considerations

14.5 Environmental hazards
Environmentally hazardous substances / marine pollutant: no

14.6 Special precautions for user: Not classified for transportation.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable

SECTION 15: Regulatory information

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

Approved code of practice:	Classification and labelling of substances and preparations dangerous for supply. Safety data sheets for substances and preparations.
Guidance notes:	Workplace Exposure Limits EH40.
EU Legislation:	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulations (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.

15.2 Chemical Safety Assessment: Not applicable. No chemical safety assessment has been carried out.

SECTION 16: Other information

Revision date:	01/06/2020
Revision:	4
Document no:	12-04EN,20-06
Risk phrases in full:	NC – not classified STOT – Specific Target Organ Toxicity

Safety Data Sheet

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

1 Identification of the substance/mixture and of the supplier

1.1 GHS Product identifier

Trade Name: Alconox®
Product number: 1101, 1103, 1104, 1104-1, 1112, 1112-1, 1125, 1150

1.2 Application of the substance / the mixture: Cleaning material/Detergent

1.2.1 Recommended dilution ratio: 1 – 2% in water

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer:
Alconox Inc.
30 Glenn St
White Plains, NY 10603
(914) 948-4040

Supplier:

Emergency telephone number:
ChemTel Inc
North America: 1-888-255-3924
International: +1 813-248-0573

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272, 29CFR1910/1200 and GHS requirements.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Eye damage, category 1.

Skin irritation, category 2.

Product at recommended dilution:
Eye irritation, category 2B

Hazard pictograms:

Signal word: Danger

Hazard statements:
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements:
P264 Wash skin thoroughly after handling.

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

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.

Hazardous Elements at Use Dilution:

Hazard Pictograms:

Signal Word: Warning
Hazard Statements:
H320 Causes eye irritation

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

Additional information: None.

Hazard description
Hazards Not Otherwise Classified (HNOC): May cause surfaces to become slippery if wet. Use caution in areas of foot traffic if on floors.

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, 29CFR1910/1200 and GHS Requirements, 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: Not determined or not available.

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 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2; H315 Eye Dam. 1; H318	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2; H315 Eye Irrit. 2; H319	2-16

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

Hazardous components at use dilution (percentages by weight):

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Eye Irrit. 2; H319	0.12 - 0.28
CAS number: 68081-81-2 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Eye Irrit. 2; H319	0.08 – 0.22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Eye Irrit. 2; H319	0.02 – 0.16

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.

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.

First aid measure at recommended dilution:

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.

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.

After swallowing:

Rinse mouth thoroughly. Seek medical attention if irritation, discomfort, or vomiting develops.

5 Firefighting measures

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

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:

No expected hazards under normal use condition.

Avoid breathing mist or vapor if aerosolized.
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

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

8 Exposure controls/personal protection

8.1 Control parameters:

a) 7722-88-5, Tetrasodium Pyrophosphate, ACGIH TWA 10 mg/m3
b) 7758-29-4, Sodium Tripolyphosphate, ACGIH TWA 10 mg/m3
c) Dusts, non-specific OEL, Irish Code of Practice
   (i) Total inhalable 10 mg/m3 (8hr)
   (ii) Respirable 4 mg/m3 (8hr)
   (iii) Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3, (8hr)

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 use conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection. Recommended to comply with ANSI Z87.1 and/or EN 166.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

Exposure Control and Personal Protective Equipment at recommended dilution:

Under normal use and operational conditions, no special personal protective equipment or engineering controls will be necessary. Handle with care.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or notavailable. Not determined or notavailable.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or notavailable.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or notavailable.
pH-value:	9.5 (1% aqueous solution)	**Relative density:**	Not determined or notavailable.

Safety Data Sheet

Effective date: 11 May 2020 **Revision**: 11 May 2020
Trade Name: Alconox®

Melting/Freezing point:	Not determined or not available.	**Solubilities**:	Not determined or notavailable.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water)**:	Not determined or notavailable.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature**:	Not determined or notavailable.
Evaporation rate:	Not determined or not available.	**Decomposition temperature**:	Not determined or notavailable.

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: Not determined or not available.
10.2 Chemical stability: Not determined or not available.
10.3 Possibility hazardous reactions: Not determined or not available.
10.4 Conditions to avoid: Not determined or not available.
10.5 Incompatible materials: Not determined or not available.
10.6 Hazardous decomposition products: Not determined or not available.

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 damage.

Tetrasodium Pyrophosphate: Risk of serious damage to eyes.

Product information at recommended dilution:

Eye irritation may occur upon direct contact with eyes. No specific hazards for skin contact, inhalation, or chronic exposure are expected within normal use parameters.

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.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.9 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: ADR, ADN, DOT, IMDG, IATA	None	
14.2 UN Proper shipping name: ADR, ADN, DOT, IMDG, IATA	None	
14.3 Transport hazard classes: ADR, ADN, DOT, IMDG, IATA	**Class:** **Label:** **LTD. QTY:**	None None 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.

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:	None
Danger code (Kemler):	None
EMS number:	None
Segregation groups:	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:	None
Tunnel restriction code:	None
UN "Model Regulation":	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 as active.
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.
EC 648/2004 – This is an industrial detergent. Contains >30% phosphate, 15-30% anionic surfactant, <5% EDTA salts
EC 551/2009 – This is not a laundry or dishwasher detergent
EC 907/2006 – Contains no enzymes, optical brighteners, perfumes, allergenic fragrances, or preservative agents

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.
H318 Causes serious eye damage.

NFPA: 1-0-0
HMIS: 1-0-0

At recommended dilution:
NFPA: 1-0-0
HMIS: 1-0-0

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.

Lehigh Hanson
HEIDELBERGCEMENT Group

Safety Data Sheet Portland Cement

Section 1. Identification

GHS product identifier: Portland Cement

Chemical name: Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.

Other means of identification: Cement, ASTM Type I, II, III, V, Portland Limestone Cement, Plastic Cement, Hydraulic Cement, Oilwell Cement, Well Cement, Class G Cement, InterCem, Type L, CSA Type GU, GUb, GUL, MS, MH, MHL, HE, HEL, LH, LHL, HS

Relevant identified uses of the substance or mixture and uses advised against: Building materials, construction, a basic ingredient in concrete.

Supplier's details: 300 E. John Carpenter Freeway, Suite 1645
Irving, TX 75062
(972) 653-5500

Emergency telephone number (24 hours): **CHEMTREC: (800) 424-9300**

Section 2. Hazards Identification

Overexposure to portland cement can cause serious, potentially irreversible skin or eye damage in the form of chemical (caustic) burns, including third degree burns. The same serious injury can occur if wet or moist skin has prolonged contact exposure to dry portland cement.

OSHA/HCS status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture:
SKIN CORROSION/IRRITATION – Category 1
SERIOUS EYE DAMAGE/EYE IRRITATION – Category 1
SKIN SENSITIZATION – Category 1
CARCINOGENICITY/INHALATION – Category 1A
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE)
[Respiratory tract irritation] – Category 3

GHS label elements

Hazard pictograms:

Signal word: Danger

Hazard statements:
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
May cause respiratory irritation.
May cause cancer.

Precautionary statements:

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust. Use outdoors in a well ventilated area. Wash any exposed body parts thouroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.Contaminated clothing must not be allowed out of the workplace.

Response: If exposed or concerned: Immediately get medical advice/attention if you feel unwell or irritation or rash occurs.If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If in eyes: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do.If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Rinse mouth. Do not induce vomiting.

Storage: Restrict or control access to stockpile areas (store locked up). Engulfment hazard: To prevent burial or suffocation, do not enter a confined space, such as a silo, bulk truck or other storage container or vessel that stores or contains cement without an effective procedure for assuring

safety. Store in a well ventilated area. Keep container tightly closed.

Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazards not otherwise classified (HNOC): None known

Supplemental Information: Respirable Crystalline Silica (RCS) may cause cancer. Repeated inhalation of respirable crystalline silica (quartz) may cause lung cancer according to IARC and NTP; ACGIH states that it is a suspected cause of cancer. Other forms of RCS (e.g., tridymite and cristobalite) may also be present or formed under certain industrial processes.

Section 3. Composition/information on ingredients

Substance/mixture: Mixture
Chemical Name: Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.

CAS number/other identifiers

Ingredient name	%	CAS number
Portland Cement	100%	65997-15-1
The structure of Portland cement may contain the following in some concentration ranges:		
Calcium oxide	A-B	1305-78-8
Quartz	C-D	14808-60-7
Hexavalent chromium*	E-F	18450-29-9
Portland cement also contains gypsum, limestone and magnesium oxide in various concentrations. However, because these components are not classifiable as a hazard under Title 29 Code of Federal Regulations 1910.1200, they are not required to be listed in this section.		
Gypsum	G-H	13397-24-5
Limestone	I-J	1317-65-3
Magnesium oxide	K-L	1309-48-4

Any concentration shown as a range is to protect confidentiality or is due to process variation.
*Hexavalent chromium is included due to dermal sensitivity associated with the component.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye Contact: Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Chemical burns must be treated promptly by a physician.

Inhalation: Seek medical help if coughing or other symptoms persist. Inhalation of large amounts of portland cement requires immediate medical attention. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If the individual is not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in a recovery position and get medical attention immediately. Maintain an open airway.

Skin Contact: Get medical attention immediately. Heavy exposure to portland cement dust, wet concrete or associated water requires prompt attention. Quickly remove contaminated clothing, shoes, and leather goods such as watchbands and belts. Quickly and gently blot or brush away excess portland cement. Immediately wash thoroughly with lukewarm, gently flowing water and non-abrasive pH natural soap. Seek medical attention for rashes, burns, irritation, dermatitis and prolonged unprotected exposure to wet cement, cement mixtures or liquids from wet cement. Burns should be treated as caustic burns. Portland cement causes skin burns with little warning. Discomfort or pain cannot be relied upon to alert a person to

a serious injury. You may not feel pain or the severity of the burn until hours after the exposure Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure.

Ingestion: Get medical attention immediately. Call a poison center or physician. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING unless directed to do so by medical personnel. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Have victim drink 60 to 240 mL (2 to 8 oz.) of water. Stop giving water if the exposed person feels sick as vomiting may be dangerous. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Most important symptoms/effects, acute and delayed potential acute health effects

Eye contact: Causes serious eye damage.
Inhalation: May cause respiratory irritation.
Skin contact: Causes severe burns. May cause an allergic skin reaction.
Ingestion: May cause burns to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following: pain, watering and redness.
Inhalation: Adverse symptoms may include the following: respiratory tract irritation and coughing.
Skin contact: Adverse symptoms may include the following: pain or irritation, redness and blistering may occur, skin burns, ulceration and necrosis may occur.
Ingestion: Adverse symptoms may include the following: stomach pains.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments: Not applicable.
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. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media: Do not use water jet or water-based fire extinguishers.
Specific hazards arising from the chemical: No specific fire or explosion hazard.
Hazardous thermal decomposition Products: Decomposition products may include the following materials: carbon dioxide, carbon monoxide, sulfur oxides and metal oxide/oxides.
Special protective actions for fire-fighters: Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not

	breathe dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders:	For personal protective clothing requirements, please see Section 8.
Environmental precautions:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has entered the environment, including waterways, soil or air. Materials can enter waterways through drainage systems.

Methods and materials for containment and cleaning up

Small spill:	Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of waste material by using a licensed waste disposal contractor.
Large spill:	Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place dust in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Large spills to waterways may be hazardous due to alkalinity of the product. Dispose of waste material using a licensed waste disposal contractor. 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). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure by obtaining and following special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material and keep the container tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
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:	A key to using the product safely requires the user to recognize that portland cement reacts chemically with water to produce calcium hydroxide which can cause severe chemical burns. Every attempt should be made to avoid skin and eye contact with cement. Do not get portland cement inside boots, shoes or gloves. Do not allow wet, saturated clothing to remain against the skin. Promptly remove clothing and shoes that are dusty or wet with cement mixtures. Launder/clean clothing and shoes before reuse. Do not enter a confined space that stores or contains portland cement unless appropriate procedures and protection are available. Portland cement can build up or adhere to the walls of a confined space and then release or fall suddenly (engulfment).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Cement, portland, chemicals	**ACGIH TLV (United States, 3/2012)** TWA: 1 mg/m³ 8hours. Form: Respirable fraction **NIOSH REL (United States, 6/2009)** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 6/2010)** TWA: 5mg/m³. 8 hours. Form: Respirable fraction TWA: 15 mg/m³. 8 hours. Form: Total dust
Calcium oxide	**ACGIH TLV (United States, 3/2012)** TWA: 2 mg/m³ 8 hours **NIOSH REL (United States, 6/2009)** TWA: 2mg/m³ 10 hours. **OSHA PEL (United States, 6/2010)** TWA: 5 mg/m³ 8 hours.
Limestone	**NIOSH REL (United States, 6/2009)** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 6/2010)** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Magnesium oxide	**ACGIH TLV (United States, 3/2012)** TWA: 10 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL (United States, 6/2010)** TWA: 15 mg/m³ 8 hours. Form: Total particulates
Crystalline Silica (Quartz) (CAS 14808-60-7)	**OSHA PEL (United States, 9/2017)** TWA: 0.3 mg/m³. Form: Total dust (1,2) TWA: 0.05 mg/m³. Form: Respirable (1,2,3) **ACGIH TLV (United States, 3/2012)** TWA: 0.025 mg/m³. Form: Respirable fraction **NIOSH REL (United States, 6/2009)** TWA: 0.05 mg/m³. Form: Respirable dust
Calcium sulfate (gypsum)	**ACGIH TLV (United States, 3/2012)** TWA: 10 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 6/2009)** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 10 mg/m³ 8 hours. Form: Total dust **OSHA PEL Z-1 (United States, 2/2006)** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust

Appropriate engineering controls: Use only with adequate ventilation. If user operations generate dust, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures: Clean water should always be readily available for skin and (emergency) eye washing. Periodically wash areas contacted by portland cement with a pH neutral soap and clean, uncontaminated water. If clothing becomes saturated with portland cement, garments should be removed and replaced with clean, dry clothing.

Eye/face protection: To prevent eye contact, wear safety glasses with side shields, safety goggles or face shields when handling dust or wet cement. Wearing contact lenses when working with cement is not recommended.

Skin protection

Hand protection: Use impervious, waterproof, abrasion and alkali-resistant gloves. Do not rely on barrier creams in place of impervious gloves. Do not get portland cement inside gloves.

Body protection: Use impervious, waterproof, abrasion and alkali-resistant boots and protective long-sleeved and long-legged clothing to protect the skin from contact with wet portland cement. To reduce foot and ankle exposure, wear impervious boots that are high enough to prevent portland cement from getting inside them. Do not get portland cement inside boots, shoes, or gloves. Remove clothing and protective equipment that becomes saturated with cement and immediately wash exposed areas of the body.

Other skin protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved. .

Respiratory protection: Use properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product, and assigned protection factor of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical State:	Solid. [Powder]	**Lower and Upper explosive flammable limits**	Not applicable
Color:	Gray or white	**Vapor pressure:**	Not applicable
Odor:	Odorless	**Vapor density:**	Not applicable
Odor threshold:	Not available	**Relative density:**	2.3 to 3.1
pH:	>11.5 [Conc. (% w/w): 1%]	**Solubility:**	Slightly soluble in water
Melting point:	Not available	**Solubility in water:**	0.1 to 1%
Boiling point:	>1000°C (>1832°F)	**Partition coefficient: n-octanol/water:**	Not applicable
Flash point:	Not flammable. Not combustible	**Auto-ignition temperature:**	Not applicable
Burning time:	Not available	**Decomposition temperature:**	Not available
Burning rate:	Not available	**SADT:**	Not available
Evaporation Rate:	Not applicable	**Viscosity:**	Not applicable
Flammability (solid, gas):	Not applicable		

Section 10. Stability and reactivity

Reactivity: Reacts slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution until reaction is substantially complete.

Chemical Stability: The product is stable.

Possibility of hazardous reactions: Under normal circumstances of storage and use, hazardous reactions will not occur.

Conditions to avoid: No specific data.

Incompatible materials: Reactive or incompatible with the following materials: oxidizing materials, acids, aluminum and ammonium salt. Portland cement is highly alkaline and will react with acids to produce a violent, heat-generating reaction. Toxic gases or vapors may be given off depending on the acid involved. Reacts with acids, aluminum metals and ammonium salts. Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas. Limestone ignites on contact with fluorine and is incompatible with acids, alum, ammonium salts, and magnesium. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride yielding possible fire and/or explosions. Silicates dissolve readily in hydrofluoric acid producing a corrosive gas-silicon tetrafluoride.

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity: Portland Cement LD50/LC50 = Not available
Irritation/Corrosion: **Skin:** May cause skin irritation. May cause serious burns in the presence of moisture.
Eyes: Causes serious eye damage. May cause burns in the presence of moisture.
Respiratory: May cause respiratory tract irritation.
Sensitization: May cause sensitization due to the potential presence of trace amounts of hexavalent chromium.
Mutagenicity: There are no data available.

Carcinogenicity:
Classification below:

Product/ingredient name	OSHA	IARC	ACGIH	NTP
Cement, portland, chemicals	-	-	A4	-
Crystalline Silica (Quartz) (CAS 14808-60-7)	-	1	A2	Known to be a human carcinogen.

Reproductive toxicity: There are no data available.
Teratogenicity: There are no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of Exposure	Target Organs
Calcium oxide	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation
Cement, portland, chemicals	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of Exposure	Target Organs
Crystalline Silica (Quartz) (CAS 14808-60-7)	Category 1	Inhalation	Respiratory tract and kidneys

Aspiration hazard: There are no data available.

Information on the likely routes of exposure

Potential acute health effects:
Eye contact: Causes serious eye damage.
Inhalation: May cause respiratory irritation.
Skin contact: Causes severe burns. May cause an allergic skin reaction.
Ingestion: May cause burns to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics:
Eye contact: Adverse symptoms may include the following: pain, watering, redness.
Inhalation: Adverse symptoms may include the following: respiratory tract irritation, coughing
Skin contact: Adverse symptoms may include the following: pain or irritation, redness, blistering may occur, skin burns, ulcerations and necrosis may occur
Ingestion: Adverse symptoms may include the following: stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure:
Short term exposure
Potential immediate effects: No known significant effects or critical hazards.
Potential delayed effects: No known significant effects or critical hazards.

Long term exposure
Potential immediate effects: No known significant effects or critical hazards.
Potential delayed effects: No known significant effects or critical hazards.

Potential chronic health effects:

General: Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. If sensitized to hexavalent chromium, a severe allergic dermal reaction may occur when subsequently exposed to very low levels.

Carcinogenicity: Portland cement is not classifiable as a human carcinogen. Crystalline silica is considered a hazard by inhalation. IARC has classified crystalline silica as a Group 1 substance, carcinogenic to humans. This classification is based on the findings of laboratory animal studies (inhalation and implantation) and epidemiology studies that were considered sufficient for carcinogenicity. Excessive exposure to crystalline silica can cause silicosis, a non-cancerous lung disease.

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: There are no data available.

Section 12. Ecological Information

Toxicity

Product/ingredient name	Result	Species	Exposure
Calcium oxide	Chronic NOEC 100 mg/L Fresh water	Fish-Oreochromis niloticus-Juvenile (Fledgling, Hatchling, Weanling)	46 days

Persistence and degradability: There are not data available.
Bioaccumulative potential: There are not data available.
Mobility in soil: Soil/water partition coefficient (Koc): Not available.
Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should 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. Untreated waste should not be released to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. 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 manner. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff, and contact with soil, waterways, drains and sewers.

Section 14. Transportation information

	DOT Classification	IMDG	IATA
UN number	Not regulated	Not regulated	Not regulated
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	None	None	None
Additional information	-	-	-

Special precautions for user: Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not available.

Section 15. Regulatory Information

TSCA 6 final risk management: Chromium, ion (Cr6+)
United States inventory (TSCA 8b): Cements are considered to be statutory mixtures under TSCA. CAS 65997-15-1 is included on the TSCA inventory.
CERCLA: This product is not listed as a CERCLA substance
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 311/312

Classification: Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire Hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Calcium oxide	A-B	No	No	No	Yes	No
Quartz	>0.1	No	No	No	No	Yes
Chromium, ion (Cr6+)	<0.1	No	No	No	Yes	Yes

SARA 313

	Product name	CAS number	%
Form R-Report requirements	Chromium, ion (Cr6+)	8540-29-9	<0.1

State regulations

Massachusetts: The following components are listed: cement, portland, chemicals, limestone
New York: None of the components are listed.
New Jersey: The following components are listed: cement, portland, chemicals, gypsum, limestone
Pennsylvania: The following components are listed: cement, portland, chemicals, gypsum, limestone

California Prop. 65

WARNING: This product contains crystalline silica and chemicals (trace metals) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the above warning in the absence of definitive testing to prove the defined risks do not exist.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Quartz	Yes	No	No	No
Chromium, ion (Cr6+)	Yes	Yes	0.001µg/day (inhalation)	8.2 micrograms/day (ingestion)

International regulations

International lists: **Canadian Domestic Substances List (DSL):** Portland cement is included on the DSL.
Mexico Inventory (INSQ): All components are listed or exempted.

Section 16. Other Information

Date of issue: 07/01/2018
Replaces: 06/01/2015
Revised Section(s): Section 8

Notice to reader

While the information provided in this safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement to produce portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or working on portland cement products, for example, portland cement concrete.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY Lehigh Hanson, except that the product shall conform to contracted specifications. The information provided herein was believed by the Lehigh Hanson to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Abbreviations

ACGIH — American Conference of Governmental Industrial Hygienists
CAS — Chemical Abstract Service
CERCLA — Comprehensive Emergency Response and Comprehensive Liability Act
CFR — Code of Federal Regulations
DOT — Department of Transportation
GHS — Globally Harmonized System
HEPA — High Efficiency Particulate Air
IATA — International Air Transport Association
IARC — International Agency for Research on Cancer
IMDG — International Maritime Dangerous Goods
NIOSH — National Institute of Occupational Safety and Health
NOEC — No Observed Effect Concentration
NTP — National Toxicology Program
OSHA — Occupational Safety and Health Administration
PEL — Permissible Exposure Limit
REL — Recommended Exposure Limit
RQ — Reportable Quantity
SARA — Superfund Amendments and Reauthorization Act
SDS — Safety Data Sheet
TLV — Threshold Limit Value
TPQ — Threshold Planning Quantity
TSCA — Toxic Substances Control Act
TWA — Time-Weighted Average
UN — United Nations

Isobutylene (0.0005% - 1.34%), Oxygen (19.5 - 23.5%) in balance Nitrogen

Safety Data Sheet 50054

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 03/24/2015 Revision date: 03/01/2018 Supersedes: 03/24/2015 Version: 1.1

SECTION 1: Identification

1.1. Identification

Product form : Mixtures

Product name : Isobutylene (0.0005% - 1.34%), Oxygen (19.5 - 23.5%) in balance Nitrogen

1.2. Recommended use and restrictions on use

Use of the substance/mixture : Test gas/Calibration gas.

1.3. Supplier

Calgaz, division of Airgas USA LLC
821 Chesapeake Drive
Cambridge, 21613 - USA
T 1-410-228-6400 - F 1-410-228-4251
info@Calgaz.com - www.Calgaz.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300
Internationally: 1-703-527-3887

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Gases under pressure Compressed gas H280 Contains gas under pressure; may explode if heated

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS04

Signal word (GHS-US) : Warning

Hazard statements (GHS-US) : H280 - Contains gas under pressure; may explode if heated

Precautionary statements (GHS-US) : P202 - Do not handle until all safety precautions have been read and understood.
P271 - Use only outdoors or in a well-ventilated area.
P403 - Store in a well-ventilated place.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C/125 °F
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG06 - Close valve after each use and when empty
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG14 - Approach suspected leak area with caution
CGA-PG21 - Open valve slowly

2.3. Other hazards which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	GHS-US classification
Nitrogen	(CAS-No.) 7727-37-9	75.16 - 80.4995	Press. Gas (Comp.), H280
Oxygen	(CAS-No.) 7782-44-7	19.5 - 23.5	Ox. Gas 1, H270 Press. Gas (Comp.), H280
Isobutylene	(CAS-No.) 115-11-7	0.0005 - 1.34	Press. Gas (Liq.), H280

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Adverse effects not expected from this product. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Adverse effects not expected from this product.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : Adverse effects not expected from this product.

Symptoms/effects after skin contact : Adverse effects not expected from this product.

Symptoms/effects after eye contact : Adverse effects not expected from this product.

Symptoms/effects after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/effects upon intravenous administration : Not known.

Chronic symptoms : Adverse effects not expected from this product.

Most important symptoms and effects, both acute and delayed : No effect on living tissue. Refer to section 11.

4.3. Immediate medical attention and special treatment, if necessary

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Specific hazards arising from the chemical

Fire hazard : The product is not flammable.

Explosion hazard : Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity : None known.

Hazardous combustion products : None known

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting : Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

Specific methods : Exposure to fire may cause containers to rupture/explode. Continue water spray from protected position until container stays cool. Move containers away from the fire area if this can be done without risk.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Ensure adequate ventilation.

6.1.1. For non-emergency personnel

Protective equipment : Wear protective equipment consistent with the site emergency plan.

Emergency procedures	:	Evacuate personnel to a safe area. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

6.1.2. For emergency responders

Protective equipment	:	Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire fighters. Equip cleanup crew with proper protection.
Emergency procedures	:	Evacuate and limit access. Ventilate area.

6.2. Environmental precautions

Try to stop release if without risk.

6.3. Methods and material for containment and cleaning up

For containment	:	Try to stop release if without risk.
Methods for cleaning up	:	Dispose of contents/container in accordance with local/regional/national/international regulations.
Methods and material for containment and cleaning up	:	None.

6.4. Reference to other sections

See also Sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed	:	Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for cylinder pressure.
Precautions for safe handling	:	Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area.
Safe handling of the gas receptacle	:	Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.
Safe use of the product	:	The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularily) checked for leaks before use. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Hygiene measures	:	Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	:	None known.
Storage conditions	:	Do not expose to temperatures exceeding 52 °C/ 125 °F. Keep container closed when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well ventilated area.
Incompatible products	:	None known.
Incompatible materials	:	Flammable materials.
Conditions for safe storage, including any incompatibilities	:	Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.
Storage area	:	Store away from heat. Store in a well-ventilated place.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Isobutylene (115-11-7)		
ACGIH	ACGIH TWA (ppm)	250 ppm

Oxygen (7782-44-7)
Not applicable

Nitrogen (7727-37-9)		
ACGIH	Remark (ACGIH)	Simple Asphyxiant

8.2. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Consider the use of a work permit system e.g. for maintenance activities. Ensure exposure is below occupational exposure limits (where available).

Environmental exposure controls : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

8.3. Individual protection measures/Personal protective equipment

Hand protection:

Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand protection

Eye protection:

Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection

Skin and body protection:

Wear suitable protective clothing, e.g. lab coats, coveralls or flame resistant clothing.

Respiratory protection:

None necessary during normal and routine operations. See Sections 5 & 6.

Thermal hazard protection:

None necessary during normal and routine operations.

Other information:

Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Gas
Appearance	:	Clear, colorless gas.
Color	:	Colorless
Odor	:	Coal gas Odorless
Odor threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	No data available
Vapor pressure	:	No data available
Relative vapor density at 20 °C	:	No data available
Relative density	:	No data available
Relative gas density	:	Lighter or similar to air
Solubility	:	Water: No data available
Log Pow	:	Not applicable for gas-mixtures. Not applicable for gas-mixtures.
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available

Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosion limits	:	No data available
Explosive properties	:	Not applicable (non-flammable gas).
Oxidizing properties	:	Supports combustion. Not combustible but enhances combustion of other substances.

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixtures with flammable materials.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Flammable materials.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Isobutylene (115-11-7)	
LC50 inhalation rat (mg/l)	620 mg/l/4h
LC50 inhalation rat (ppm)	239620.46 ppm/4h
ATE US (gases)	239620.460 ppmV/4h
ATE US (vapors)	620.000 mg/l/4h
ATE US (dust, mist)	620.000 mg/l/4h

Oxygen (7782-44-7)	
LC50 inhalation rat (ppm)	800000 ppm/4h
ATE US (gases)	800000.000 ppmV/4h

Nitrogen (7727-37-9)	
LC50 inhalation rat (ppm)	820000 ppm/4h
ATE US (gases)	820000.000 ppmV/4h

Skin corrosion/irritation	:	Not classified
Serious eye damage/irritation	:	Not classified
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified

Isobutylene (115-11-7)	
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity

Reproductive toxicity	:	Not classified
Specific target organ toxicity – single exposure	:	Not classified
Specific target organ toxicity – repeated exposure	:	Not classified

Aspiration hazard	:	Not classified
Symptoms/effects after inhalation	:	Adverse effects not expected from this product.
Symptoms/effects after skin contact	:	Adverse effects not expected from this product.
Symptoms/effects after eye contact	:	Adverse effects not expected from this product.
Symptoms/effects after ingestion	:	Ingestion is not considered a potential route of exposure.
Symptoms/effects upon intravenous administration	:	Not known.
Chronic symptoms	:	Adverse effects not expected from this product.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

12.2. Persistence and degradability

Isobutylene (0.0005% - 1.34%), Oxygen (19.5 - 23.5%) in balance Nitrogen	
Persistence and degradability	No data available.

Isobutylene (115-11-7)	
Persistence and degradability	The substance is readily biodegradable. Unlikely to persist.

Oxygen (7782-44-7)	
Persistence and degradability	No ecological damage caused by this product.

Nitrogen (7727-37-9)	
Persistence and degradability	No ecological damage caused by this product.

12.3. Bioaccumulative potential

Isobutylene (0.0005% - 1.34%), Oxygen (19.5 - 23.5%) in balance Nitrogen	
Log Pow	Not applicable for gas-mixtures.
Log Kow	Not applicable for gas-mixtures.
Bioaccumulative potential	No data available.

Isobutylene (115-11-7)	
Log Pow	2.35
Bioaccumulative potential	Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.

Oxygen (7782-44-7)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No ecological damage caused by this product.

Nitrogen (7727-37-9)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Isobutylene (0.0005% - 1.34%), Oxygen (19.5 - 23.5%) in balance Nitrogen	
Mobility in soil	No data available

Isobutylene (115-11-7)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

Oxygen (7782-44-7)	
Ecology - soil	No ecological damage caused by this product.

Nitrogen (7727-37-9)	
Ecology - soil	No ecological damage caused by this product.

12.5. Other adverse effects

Effect on ozone layer	:	None
Effect on global warming	:	No known effects from this product.
GWPmix comment	:	No known effects from this product.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste treatment methods : Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded.

Product/Packaging disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN1956 Compressed gas, n.o.s., 2.2

UN-No.(DOT) : UN1956

Proper Shipping Name (DOT) : Compressed gas, n.o.s.

Hazard labels (DOT) : 2.2 - Non-flammable gas

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302;305

DOT Packaging Bulk (49 CFR 173.xxx) : 314;315

DOT Symbols : G - Identifies PSN requiring a technical name

DOT Packaging Exceptions (49 CFR 173.xxx) : 306;307

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 75 kg

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 150 kg

DOT Vessel Stowage Location : A - The material may be stowed ‘‘on deck’’ or ‘‘under deck’’ on a cargo vessel and on a passenger vessel.

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers: - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transportation of Dangerous Goods

Transport by sea

Transport document description (IMDG) : UN 1956 Compressed gas, n.o.s., 2.2

UN-No. (IMDG) : 1956

Proper Shipping Name (IMDG) : Compressed gas, n.o.s.

Class (IMDG) : 2.2 - Non-flammable, non-toxic gases

Limited quantities (IMDG) : 120 ml

Air transport

Transport document description (IATA) : UN 1956 Compressed gas, n.o.s., 2.2

UN-No. (IATA) : 1956

Proper Shipping Name (IATA) : Compressed gas, n.o.s.

Class (IATA) : 2

SECTION 15: Regulatory information

15.1. US Federal regulations

Isobutylene (115-11-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Oxygen (7782-44-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

Isobutylene (115-11-7)
Listed on the Canadian DSL (Domestic Substances List)

Oxygen (7782-44-7)
Listed on the Canadian DSL (Domestic Substances List)

Nitrogen (7727-37-9)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Isobutylene (115-11-7)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Oxygen (7782-44-7)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Nitrogen (7727-37-9)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations

Isobutylene (115-11-7)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Japanese ISHL (Industrial Safety and Health Law) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on INSQ (Mexican National Inventory of Chemical Substances) Listed on the TCSI (Taiwan Chemical Substance Inventory)

Oxygen (7782-44-7)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on INSQ (Mexican National Inventory of Chemical Substances) Listed on the TCSI (Taiwan Chemical Substance Inventory)

Nitrogen (7727-37-9)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on INSQ (Mexican National Inventory of Chemical Substances) Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

Isobutylene (115-11-7)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Oxygen (7782-44-7)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Nitrogen (7727-37-9)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Revision date : 03/01/2018

Other information : This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product.

Full text of H-phrases:

H270	May cause or intensify fire; oxidizer
H280	Contains gas under pressure; may explode if heated

SDS US (GHS HazCom 2012)

This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this gas mixture. To the best of Calgaz's knowledge, the information contained herein is reliable and accurate as of this date; however, accruacy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

SAFETY DATA SHEET

Version 6.7
Revision Date 06/07/2021
Print Date 08/29/2021

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

1.1 Product identifiers

Product name : Hydrochloric acid

Product Number : H1758
Brand : Sigma
Index-No. : 017-002-01-X
CAS-No. : 7647-01-0

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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

Corrosive to Metals (Category 1), H290
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H335	May cause respiratory irritation.

Precautionary statement(s)	
P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P406	Store in corrosive resistant container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Component		Classification	Concentration
Hydrochloric Acid			
CAS-No. EC-No. Index-No. Registration number	7647-01-0 231-595-7 017-002-01-X 01-2119484862-27-XXXX	Met. Corr. 1; Skin Corr. 1B; Eye Dam. 1; STOT SE 3; H290, H314, H318, H335 Concentration limits: >= 0.1 %: Met. Corr. 1, H290; >= 25 %: Skin Corr. 1B, H314; 10 - < 25 %: Skin Irrit. 2, H315; 10 - < 25 %: Eye Irrit. 2, H319; >= 10 %: STOT SE 3, H335;	>= 30 - < 50 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

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

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

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

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas
Hydrogen chloride gas
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent and neutralising material (e.g. Chemizorb® H^+, Merck Art. No. 101595). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
No metal containers.
Tightly closed.
Storage class (TRGS 510): 8B: Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Hydrochloric Acid	7647-01-0	C	2 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		

		C	5 ppm 7 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5 ppm 7 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		C	5 ppm 7 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	0.3 ppm 0.45 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	2 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 120 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection
Acid-resistant protective clothing

Respiratory protection
required when vapours/aerosols are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: light yellow
b)	Odor	pungent
c)	Odor Threshold	No data available
d)	pH	< 1 at 20 °C (68 °F)
e)	Melting point/freezing point	-30 °C (-22 °F)
f)	Initial boiling point and boiling range	> 100 °C > 212 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	227 hPa at 21.1 °C (70.0 °F) 547 hPa at 37.7 °C(99.9 °F)
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	Not applicable
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Bases, Amines, Alkali metals, Metals, permanganates, for example potassium permanganate, Fluorine, metal acetylides, hexalithium disilicideMetals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Mixture

Acute toxicity
Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract
Dermal: No data available

Skin corrosion/irritation
Mixture causes burns.

Serious eye damage/eye irritation
Mixture causes serious eye damage. Risk of blindness!

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure

Mixture may cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: MW4025000
Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Components

Hydrochloric Acid

Acute toxicity
Oral: No data available
Inhalation: Cough Difficulty in breathing
Inhalation: absorption
Inhalation: Corrosive to respiratory system.
Symptoms: mucosal irritations, Cough, Shortness of breath, Inhalation may lead to the formation of oedemas in the respiratory tract., Possible damages:, damage of respiratory tract, tissue damage
Dermal: No data available

Skin corrosion/irritation
Skin - reconstructed human epidermis (RhE)
Result: Corrosive
(OECD Test Guideline 431)

Serious eye damage/eye irritation
Eyes - Bovine cornea
Result: Corrosive
(OECD Test Guideline 437)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Result: Conflicting results have been seen in different studies.

Carcinogenicity
Carcinogenicity - Did not show carcinogenic effects in animal experiments. (IUCLID)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.
The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.

Acute inhalation toxicity - mucosal irritations, Cough, Shortness of breath, Inhalation may lead to the formation of oedemas in the respiratory tract., Possible damages:, damage of respiratory tract, tissue damage

Specific target organ toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.**Aspiration hazard**
No aspiration toxicity classification

SECTION 12: Ecological information

12.1 Toxicity

Mixture
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

Components

Hydrochloric Acid
No data available

Toxicity to fish	LC50 - Gambusia affinis (Mosquito fish) - 282 mg/l - 96 h Remarks: (IUCLID)

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1789 Class: 8 Packing group: II
Proper shipping name: Hydrochloric acid

Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1789 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: HYDROCHLORIC ACID

IATA
UN number: 1789 Class: 8 Packing group: II
Proper shipping name: Hydrochloric acid

SECTION 15: Regulatory information

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

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

	CAS-No.	Revision Date
Hydrochloric Acid	7647-01-0	2013-02-08

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Hydrochloric Acid	7647-01-0	2013-02-08

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
water	7732-18-5	
Hydrochloric Acid	7647-01-0	2013-02-08

New Jersey Right To Know Components

	CAS-No.	Revision Date
water	7732-18-5	
Hydrochloric Acid	7647-01-0	2013-02-08

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to

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